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ABSTRACT

This guide is intended to orient research organizations interested in establishing a program relationship with the United States Department of Energy (DOE). The publication is divided into two parts. Part I describes DOE research and development programs, summarizes budget data, and lists contact persons for DOE programs. In addition, this section identifies current research needs and potential areas for new research opportunities under each program. Part II provides an overview of policies and procedures for the submission, evaluation, and administration of grants, cooperative agreements, and research contracts. (WB)

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The DOE Program Guide for Universities & Other Research Groups

Department of Energy
March 1980

SE 032 897

U.S. DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

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Additional copies of this guide can be obtained by writing to:
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Oak Ridge, TN 37830

Prepared by

Procurement and Contracts
Management Directorate
and
Office of Energy Research
U.S. Department of Energy
Washington, D.C. 20585

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The DOE Program Guide for Universities and Other Research Groups

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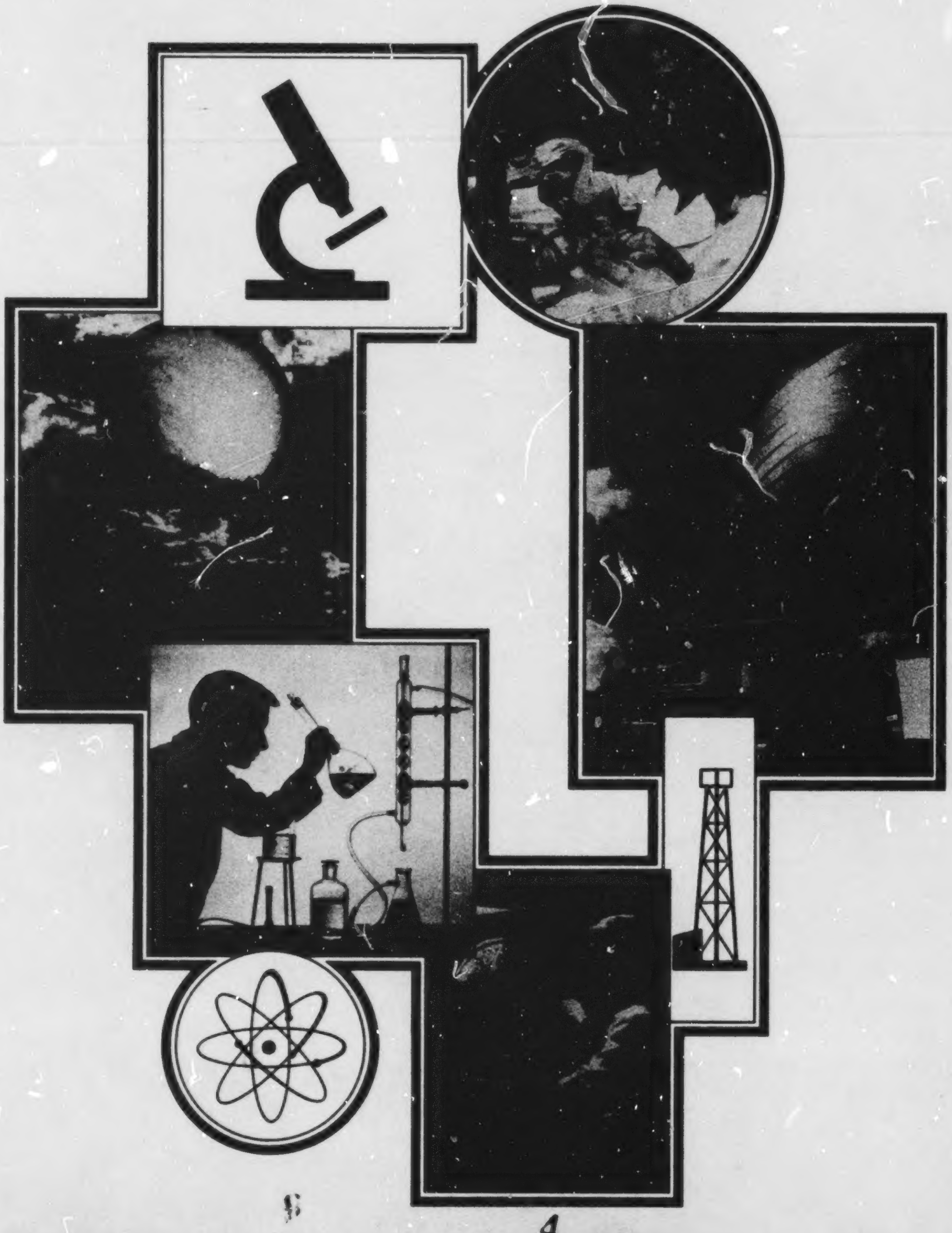
Part I. DOE Research and Development Programs

Part II. DOE Procurement and Assistance Policies/Procedures



Foreword

The Department of Energy is the principal Federal agency responsible for implementing the National Energy Plan. As such the Department has important responsibilities that include establishing and enforcing regulatory standards, promoting the collection and analysis of information on energy sources and production, supporting energy conservation efforts, and fostering advanced research and development on all energy resources, both current and potential. This guide is addressed to the last of these areas of responsibility.

From the beginning of DOE, researchers at universities and other organizations have had to consult a considerable quantity of DOE documents and publications before developing a research proposal for the Department. This guide is intended to provide, in a single publication, all the fundamental information an institution needs to develop a potential working relationship with DOE.

The guide supplies introductory information about DOE programs, general procedures, and most importantly, energy research needs and potential opportunities. It should help you in determining whether the research interests and resources of universities, colleges and other research organizations match the needs of the Department of Energy.

This guide also describes existing Federal assistance and procurement policies and procedures and discusses those currently under development or revision that will affect universities or other research organizations associated with DOE. We want these organizations to become early partners in the development of policies affecting them.

We welcome your comments and suggestions on this guide and how it can be improved in the future. Please address such comments to:

Division of Institutional Programs (ER-44)
Office of Field Operations Management
Office of Energy Research
U.S. Department of Energy
Washington, D.C. 20585

Sincerely,

John M. Deutch
Under Secretary

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Purpose

...of DOE

The Department of Energy was established by Public Law 95-91 dated August 4, 1977, and was activated on October 1, 1977. The Department has three main purposes. These are:

- To utilize efficiently all available energy supplies;
- To augment available energy supplies by the substitution of coal for petroleum products and by the development of new or more efficient sources of supply; and
- To encourage domestic energy production so that United States dependency on energy imports will be reduced.

To accomplish these objectives, DOE efforts cover the full spectrum of energy sources and use, from the short term, such as increased coal production, to the long term, such as fusion energy.

DOE actively solicits the help of the university community and other non-Federal research organizations to make the United States both energy efficient and energy independent.

...of this Guide

The purpose of this guide is to meet the informational needs of academic and other non-Federal research organizations, regarding the establishment of a program relationship with DOE. It does this by providing a single-source introduction to DOE; an overview of DOE outlay programs and projected budgets for FY 1980 and FY 1981; a summary of potential DOE research interests; and a brief description of the procurement and reporting processes applicable to contracts, grants, cooperative agreements and other forms of Federal support. This guide is intended solely for general informational purposes and as a convenient reference tool. Specific legal requirements, policies and procedures are contained in applicable laws and published regulations (see page 87).

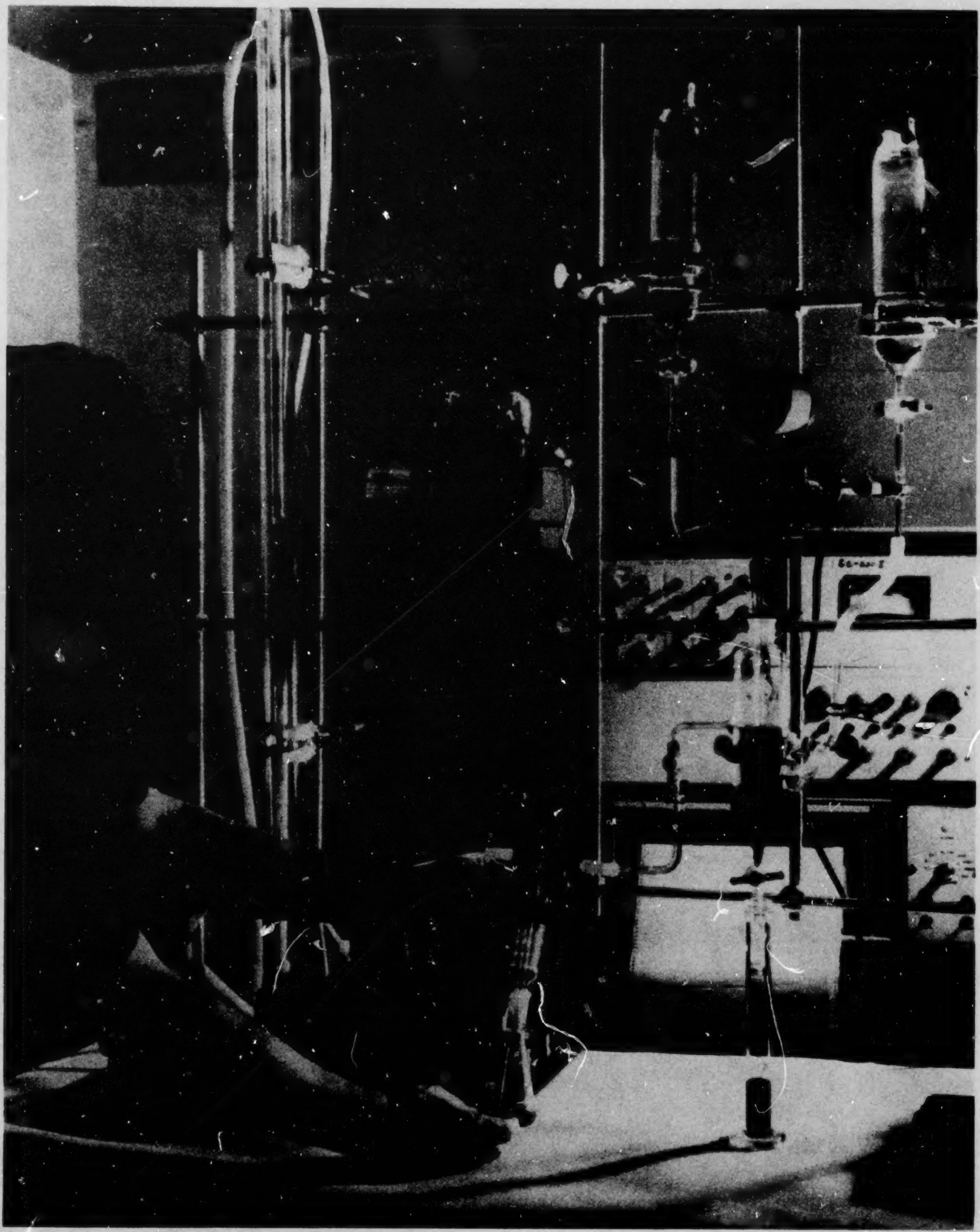
The guide is divided into two parts:

Part I. DOE Research and Development Programs

It is intended that Part I serve the research community by describing DOE research and development programs, identifying areas of additional research needs and potential areas for new research opportunities. Additionally, it summarizes budget data and identifies the DOE program information contacts for each program.

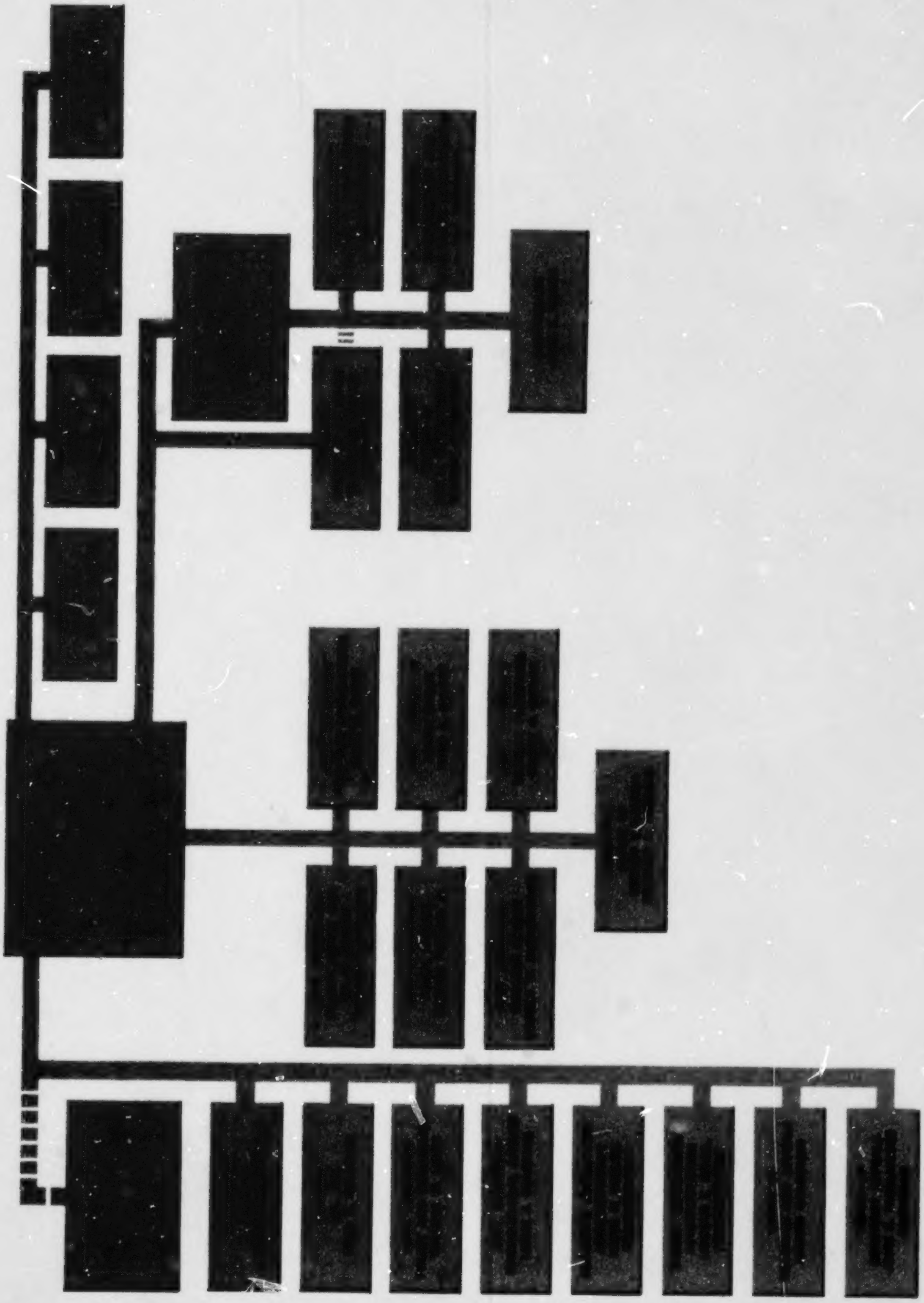
Part II. DOE Procurement and Assistance Policies/Procedures

Part II provides researchers and research administrators with an introduction to the DOE administrative policies and procedures for submission and evaluation of proposals and the administration of resulting grants, cooperative agreements, and research contracts.



Part I.
DOE Research and Development Programs

Department of Energy Organization



Part I
DOE Research and Development Programs

DOE Headquarters

DOE headquarters in Washington, D.C., is responsible for overall program management including program planning, scheduling, budgeting, resource allocation, and coordination, as well as for the maintenance of relations with other Federal agencies and the Congress. The headquarters staff also issues management directives and broad policy overviews. The structure of the Department, as formulated in the October 1, 1979 reorganization, is shown on the preceding page.

Secretarial Level

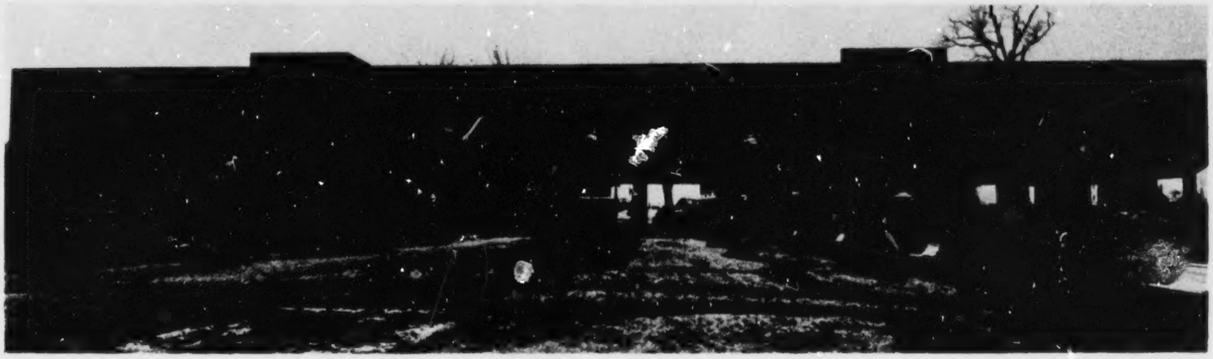
The Secretary of Energy is the chief executive officer of the Department of Energy. The Secretary's senior staff consists of a Deputy Secretary, an Under Secretary, a Chief Financial Officer, the Director of Energy Research and a number of Assistant Secretaries and Administrators responsible for major programs.

Major Outlay Programs

Major DOE technical outlay programs are organized under six Assistant Secretaries and a Director of Energy Research. They are responsible for: energy research, environment, conservation and solar energy, resource applications, fossil energy, nuclear energy, and defense programs. Other offices, including the Assistant Secretary for Policy and Evaluation, the Administrator for Energy Information, the Office of Consumer Affairs, and the Office of Minority Economic Impact, develop and carry out various programs designed to collect and analyze information on energy supply and demand and the impact of energy utilization on the general public.

The Office of Energy Research has particular agency-wide cognizance over research support to universities, providing about 45 percent of the Department's total support to such institutions.

The following pages include descriptions of each of the major program areas and the Department's extensive scientific, engineering, technology and production facilities, and related administrative units, which are dispersed nationwide. They consist of field and project offices, laboratories, engineering facilities and production plants located throughout the United States. The Office of Energy Research provides an overall coordination function for the Under Secretary in managing these resources known as field facilities. A summary of major DOE field organizations begins at page 75.

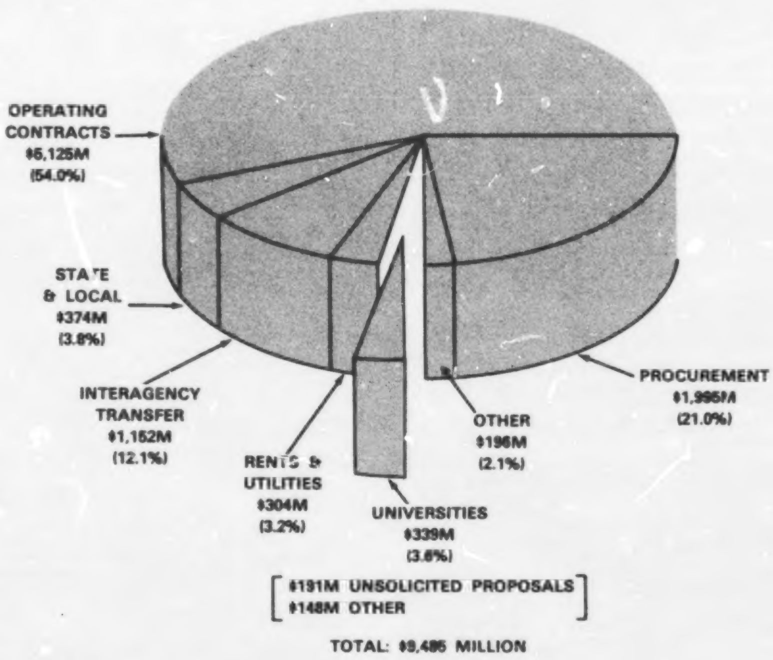


Decentralization Policy and the Assignment of Lead Missions

Although there are exceptions, DOE has determined that placing project management close to the site of operations is desirable whenever possible, especially for construction and pilot plant projects. It is DOE policy to decentralize project management activities outside of Washington, D.C., and to assign management of energy research, development and demonstration projects at an office located near the work, such as at an operations office or a special site project office. The establishment of lead missions is one important element of this policy.

Lead mission assignments within DOE involve the delegation of significant project management and program implementation authority and responsibilities to elements of the field organization. Overall program management responsibility remains at headquarters. Lead mission assignments to operations offices and laboratories are made to ensure effective execution of outlay programs. Field facilities with lead mission assignments may be given varying degrees of program responsibility, including in some instances responsibility for proposal review and evaluation, and award recommendations. The degree of management responsibility assigned to a DOE field facility may vary substantially from program to program. In some cases, the field facility provides only technical assistance in program planning and/or the review and evaluation of proposals. Further details of decentralization and lead missions should be obtained from the Program Information Contacts cited throughout this guide.

DOE Budget Obligations by Type of Procurement FY 1979



Budget Considerations

The figure above is presented to illustrate the size of the total DOE budget and to highlight the proportion of the total budget available for university research and development initiatives.

Budget percentages in general are expected to be similar for 1980 and subsequent fiscal years. Interagency Transfers are primarily for the Strategic Petroleum Reserve. Operating Contracts are primarily for government-owned contractor-operated facilities and activities. Ongoing Procurements represent contract extensions and modifications. Budget outlays (excluding operating contracts) for research and development by colleges and universities amounted to $281 million in 1979 and are presently estimated at $320 million for 1980 and $361 million for 1981.

A breakdown of funds for university research and development (direct awards only) by major program areas is shown in the following table.

In addition, during 1979 approximately $60 million was provided by DOE industrial contractors and National Laboratories on a subcontract basis for university research and development projects.

Research Needs and Opportunities

The following section is devoted to a brief description of the major outlay programs of the Department of Energy and those technical programs included under each. These major areas are:

- Energy Research
- Environment
- Conservation and Solar Energy
- Resource Applications
- Fossil Energy
- Nuclear Energy
- Defense Programs

Also included are descriptions of programs under the Assistant Secretary for Policy and Evaluation, the Energy Information Administration, the Office of Consumer Affairs, and the Office of Minority Economic Impact, which afford some opportunities for university participation. To assist the reader in determining field activity relationships, each major area discussed includes a brief section entitled "Field Elements."

Program objectives are cited for each technical program, together with a listing of problem areas requiring additional research and potential areas for new research initiatives. Summary budget data

Summary of DOE Support for University Research and Development (Direct Awards Only)

PROGRAMS	[illegible]		[illegible]		[illegible]	
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

ENERGY RESEARCH

FUSION ENERGY	[illegible]		[illegible]		[illegible]	
HIGH ENERGY PHYSICS	[illegible]		[illegible]		[illegible]	
NUCLEAR PHYSICS	[illegible]		[illegible]		[illegible]	
BASIC ENERGY SCIENCES	[illegible]		[illegible]		[illegible]	
TECHNICAL ASSESSMENT PROJECTS	[illegible]		[illegible]		[illegible]	
UNIVERSITY RESEARCH SUPPORT	[illegible]		[illegible]		[illegible]	
SUBTOTAL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

ENVIRONMENT

LIFE SCIENCES RESEARCH AND NUCLEAR MEDICINE APPLICATIONS	[illegible]		[illegible]		[illegible]	
ENVIRONMENTAL OVERVIEW AND ASSESSMENT	[illegible]		[illegible]		[illegible]	
BIOLOGICAL AND ENVIRONMENTAL RESEARCH	[illegible]		[illegible]		[illegible]	
SUBTOTAL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

CONSERVATION AND SOLAR ENERGY

CONSERVATION						
ENERGY STORAGE SYSTEMS	[illegible]		[illegible]		[illegible]	
BUILDINGS AND COMMUNITY SYSTEMS	[illegible]		[illegible]		[illegible]	
INDUSTRIAL ENERGY CONSERVATION	[illegible]		[illegible]		[illegible]	
TRANSPORTATION ENERGY CONSERVATION	[illegible]		[illegible]		[illegible]	
SUBTOTAL CONSERVATION	[illegible]		[illegible]		[illegible]	
SOLAR ENERGY						
SOLAR APPLICATIONS NEAR TERM	[illegible]		[illegible]		[illegible]	
SOLAR TECHNOLOGY LONGER TERM	[illegible]		[illegible]		[illegible]	
SUBTOTAL SOLAR	[illegible]		[illegible]		[illegible]	
SUBTOTAL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

FOSSIL ENERGY

COAL	[illegible]		[illegible]		[illegible]	
PETROLEUM	[illegible]		[illegible]		[illegible]	
GAS	[illegible]		[illegible]		[illegible]	
SUBTOTAL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

1/ Planning estimates only. Subject to change in Congressional Budget Review.

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RESOURCE APPLICATIONS

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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

NUCLEAR ENERGY

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DEFENSE PROGRAMS

[illegible]	[illegible]		[illegible]		[illegible]	
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TOTAL DOE

	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

ESTIMATED GROWTH

[illegible]		[illegible]	
[illegible]			[illegible]

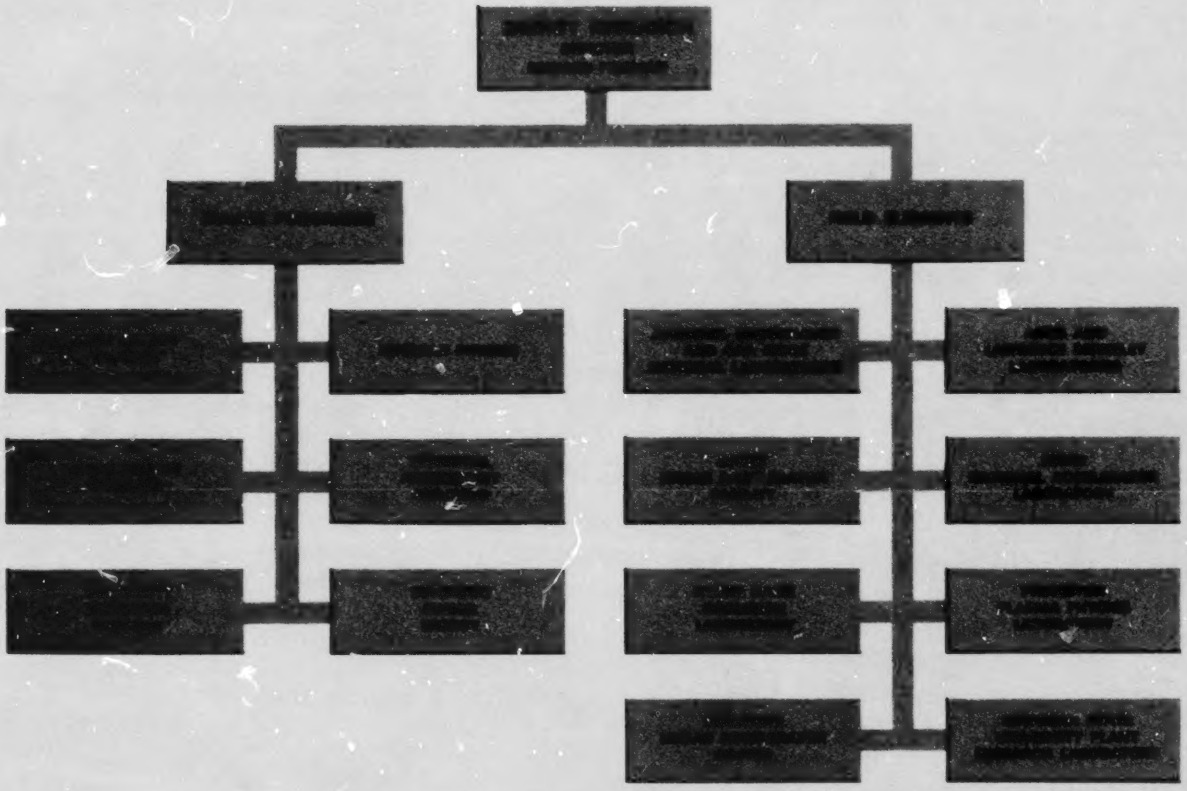
1/ Planning estimates only. Subject to change in Congressional Budget Review.

is provided to show the portion of funds for basic research, applied research, development, and the total funding. The portion of the total program budget allocated for the support of research and development in universities is shown as a separate item.

A point of contact is listed along with program-specific references that will provide additional information. Telephone numbers for points of contact listed in this guide may be changed from time to time. **Current DOE headquarters telephone numbers may be obtained by dialing the DOE locator (202) 252-5000.**

The interested researcher seeking preproposal guidance on research needs and opportunities should recognize that, while the ultimate program management responsibility rests with DOE headquarters, day-to-day decisions on the kinds of research to be supported may be delegated to a DOE field facility. In such instances effort should be made to identify and communicate with the appropriate project manager in the field.

Office of Energy Research



General Description

The Director of Energy Research advises the Secretary on DOE physical research programs, the Department's overall energy research and development programs, university-based education and training activities, grants and other forms of financial assistance. The Director also carries out additional duties assigned to the Office related to basic and advanced research, and monitors the well-being and management of the multiprogram laboratories under the jurisdiction of the Department.

Each Office of Energy Research major program is summarized on the following pages.

Field Elements

Five multiprogram and six single-purpose laboratories are administratively assigned to the Office of Energy Research. Each of the five multiprogram laboratories is briefly described later in this guide. The single-purpose or specialized laboratories are the Bates Linear Accelerator Facility at the Massachusetts Institute of Technology, the Fermi National Accelerator Laboratory, the Notre Dame Radiation Laboratory, the Princeton University Plasma Physics Laboratory, the Michigan State University Plant Research Laboratory and the Stanford Linear Accelerator Center. The multiprogram laboratories conduct significant research activities for other DOE programs (e.g., Environment) and other Federal agencies, while the six specialized laboratories are funded almost totally by the Office of Energy Research.

General Program Information Contact

Richard Stephens, Director, Division of Institutional Programs
Dial DOE locator (202) 252-5000 for current telephone number.

Reference

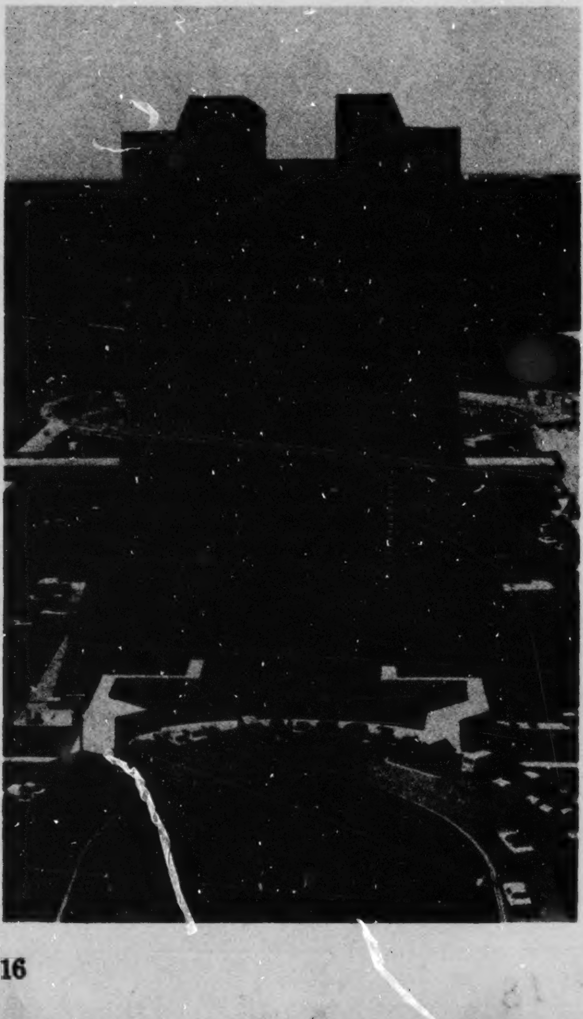
Office of Energy Research Annual Report 1979.

High Energy Physics

Program Structure

The High Energy Physics Program is a basic research program which develops high technology and new knowledge of great value to energy programs. Its primary motivation is to understand the fundamental nature of matter and energy and their transformations. DOE provides about 90% of the Federal support, with the National Science Foundation providing the remainder. The central goal of these efforts is to achieve a comprehensive theoretical and experimental understanding of the fundamental constituents of matter and energy, the basic forces that govern their interactions, and their manifestation in the properties and dynamics of high energy phenomena. Experimental and theoretical research teams at universities have enjoyed broad access to DOE services and facilities.

University research groups perform approximately 75% of the experiments scheduled at the three DOE high energy accelerators—Brookhaven National Laboratory, Fermi National Accelerator Laboratory, and Stanford Linear Accelerator Center. These laboratories are managed by universities or consortia of universities to provide unique and complementary capabilities in colliding beam facilities and fixed target accelerator systems which are vital to the frontier research program in high energy physics. University research, whether experimental or theoretical, is usually jointly funded by DOE and the home institution.



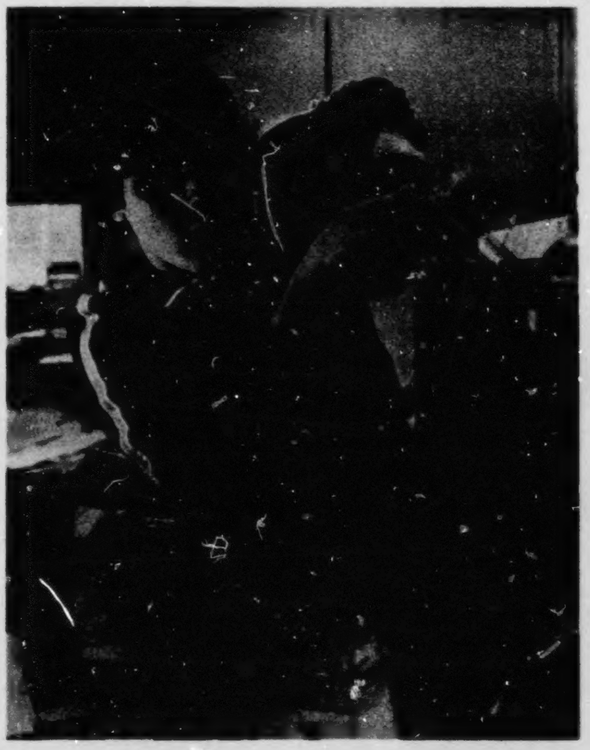
Unsolicited proposals from universities to DOE for research support are analyzed by the High Energy Physics Program staff and undergo external peer review. Independently, experimental research proposals are submitted to national accelerator laboratories for review by a laboratory program advisory committee consisting of a panel of university and laboratory experts. The final decision to make accelerator facilities available for a particular experiment rests with the laboratory and is based on the scientific merit of the research proposal. Successful research proposals for DOE support usually receive one-year contracts with provisions for review and renewal on an annual basis. Research results are expected to be published in appropriate journals. In addition to contributions of university research groups in forefront basic investigations, the universities provide fertile training grounds for the influx of new talent, which is essential to maintain the greatest vitality and creativity of the High Energy Physics program.

Program Objectives

- Identify the ultimate constituents and structure of matter and energy;
- Understand the basic forces in nature which govern all interactions of matter and energy;
- Seek and discover new physical phenomena using high energy subnuclear particle interactions;
- Maintain U.S. program in a world leadership position; and
- Be alert to opportunities for the transfer of new technology developments and breakthroughs in high energy physics to energy development programs.

Long Range Planning for High Energy Physics

A typical experiment in high energy physics requires 3 to 5 years from design of apparatus to publication of results while a new accelerator facility usually consumes 8 to 10 years from conception to first beam operation. In cooperation with the High Energy Physics Advisory Panel and the National Science Foundation, the DOE High Energy Physics Program frequently updates its long-term strategy for fulfilling the future needs of a strong and innovative research base. The strategy supports the construction of specific new accelerator facilities, effective operation of existing facilities, new funding for outstanding junior investigators, effective budget stability with concurrent flexibility to meet unanticipated economic and scientific developments, and international collaboration for selected endeavors. The role of university scientists in determining and implementing long-range goals is important and pivotal to all aspects of the program. For example, the electron-positron colliding beam facility at Stanford, the proton-proton colliding beam facility at Brookhaven, and the 1000 GeV proton facility at the Fermi Laboratory are major facilities under construction for research productivity during the 1980s. The Outstanding Junior Investigator Awards have enabled creative young tenure-track scientists at the universities to launch independent research projects. Through DOE program directors, sponsored research offices, advisory committees, special panels, consultant contracts, the basic research effort, and other avenues, colleges and universities have participated directly in DOE attempts to seek the highest level of competence available for research requiring unique skills and expertise.



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Program Information Contact
High Energy Physics—W. A. Wallenmeyer, (301) 353-3624

Selected References
1. Summaries of Research in High Energy Physics, DOE/ER-0014.
2. High Energy Physicists and Graduate Students, Census, DOE/ER-0019.
3. High Energy Physics - The Ultimate Structure of Matter, DOE/ER-0027.

*Does not include support provided through the National Laboratories.

Nuclear Physics

Program Objectives

The DOE Nuclear Physics Program is the major Federal research effort concerned with advanced experimental and theoretical studies of the interactions, structure, and other fundamental characteristics of nuclei. Its three major components are: Medium Energy Nuclear Physics, Heavy Ion Nuclear Physics, and Nuclear Theory. Medium Energy and Heavy Ion Nuclear Physics are experimental efforts heavily dependent upon the existence and effective operation of major accelerator facilities. Of these, five are operated as national facilities where beam time is made available to the Nation's scientists on the basis of scientific merit and technical feasibility of proposals submitted. The national facilities are: the Clinton P. Anderson Meson Physics Facility at the Los Alamos National Scientific Laboratory; the William H. Bates Linear Accelerator at Massachusetts Institute of Technology; the SuperHILAC at Lawrence Berkeley Laboratory; the Bevalac at Lawrence Berkeley Laboratory; and the double MP tandem van de Graaff facility at Brookhaven National Laboratory. The new Holifield Heavy Ion Research Facility at Oak Ridge National Laboratory will begin operation in June 1980 as a national facility. Each of the national facilities, as well as smaller accelerators at Argonne National Laboratory, the University of Washington, Yale University, and Lawrence Berkeley Laboratory, accommodates major university-based user group research programs. A typical group plans experiments at the home institution, executes and partially analyzes experiments at the national facility, and completes analyses and publication of results at the home institution. The DOE Nuclear Physics program is the major Federal supporter of such university-based user groups in the field of nuclear research. The Nuclear Theory effort is closely related to the experimental work in that it provides guidance to experiments along those lines most likely to yield a deeper and more unified understanding of nuclear phenomena, and it helps to interpret experimental results in terms of fundamental theory. Support of work under Nuclear Theory is almost equally divided between national laboratory-based theorists and university-based theorists.

Major Objectives

- To describe quantitatively the structure of complex nuclei in terms of the fundamental interactions that occur among neutrons and protons;
- To use nuclei as a laboratory for the study of fundamental forces in nature;
- To develop phenomenological understandings in those cases where the nuclear system is too complex to be treated in terms of fundamental forces;
- To advance research capability by developing new facilities, improving beams available to existing facilities and equipping experimental areas with advanced instrumentation;
- To identify practical applications resulting from nuclear research studies and to transfer the results to the appropriate scientific discipline or technology; and
- To maintain a position of leadership in nuclear research for the United States.

Long Range Planning for Nuclear Physics

In cooperation with the Department of Energy and the National Science Foundation, the Nuclear Science Advisory Committee has developed a long-range national plan for basic nuclear research. The plan recognizes the central importance of accelerator facilities and related instrumentation. It specifically calls for a balanced mixture of new facility construction and upgrading of existing facilities in order that major scientific questions may be attacked with adequate tools and in order that America's position of leadership in nuclear research may be maintained. However, the plan also clearly recognizes that our greatest asset is the creativity and innovativeness of American scientists. The role of university-based scientists is of central importance to this endeavor, both for the intellect and other resources they bring to bear on today's research program and for providing a fertile training ground for creative and innovative scientists in the future.

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Program Information Contact
E. T. Ritter, (301) 353-3613

Selected References (Available by request)

1. Program Information, Office of High Energy and Nuclear Physics, May 1979.
2. Summaries of FY 1978 Research in Nuclear Physics, December 1978.

Basic Energy Sciences

Program Objective

The Basic Energy Sciences Program is the major supporter within DOE of basic research chosen for its importance to the energy goals of the Department. The charter of Basic Energy Sciences, which in FY 1980 has a total budget of $230 million, is to conduct a program of basic research that has elements relevant to each of the Department's energy technology programs. The product of Basic Energy Sciences is knowledge, insight and information that is needed for the development of an optimized national energy system. The subject matter of the research relates, in general terms, to the supply of energy, its prudent use, and its environmental suitability.

The Basic Energy Sciences office assigns priorities to specific scientific areas, based on a judgment of their importance to the Department's mission. The detailed substance of the program, however, is determined by the selection of unsolicited proposals and ideas from the university/scientific community and from the staffs of the DOE laboratories. Since basic research is usually carried out within the framework of the disciplines, the program is structured and managed mostly along disciplinary lines.

There are six subprograms:

- Nuclear Sciences
- Materials Sciences
- Chemical Sciences
- Engineering, Mathematical and Geosciences
- Biological Energy Research
- Advanced Energy Projects

The titles are descriptive, but fail to convey the range of subject matter covered. For example, Chemical Sciences includes research in atomic and molecular physics, nearly all aspects of chemistry, chemical instrumentation, and some chemical engineering. Coverage by the other subprograms is similarly broad.

There are currently more than 1,100 research projects funded by Basic Energy Sciences. The following two breakdowns categorize them from two aspects:

The category "Multi-technology" means that successful research results will benefit more than one technology. The category "Long Term Advancement of Science" includes topics so basic in nature that it is unreasonable to assign the benefits to a specific applied program, yet the research is in a scientific area judged to be important to the future of energy.

Assignment of research to technology categories is subjective. Inevitably, good research is useful for applications that were not, and could not, have been predicted.

Problems Areas Requiring Additional Research

Each of the subprograms in Basic Energy Sciences has selected technical areas that are to be emphasized. It would be impractical to list them here in any detail. Those interested should obtain this information by contacting the individuals listed under "Program Information Contact."

Information on Program Execution

Unsolicited research proposals are first screened by program officials, and if appropriate, are evaluated by peer review. Successful proposers are usually awarded one-year grants, with the expectation that extensions for at least two additional yearly periods will be required, contingent on satisfactory performance. Most projects have a much longer life. Minimal technical reporting requirements are imposed, basically those needed for decisions as to renewal or termination. A one-to two-year phaseout period is granted to those finishing research projects, in order to bring the work to an orderly conclusion and to support graduate students finishing their thesis research. All results must be published in the appropriate scientific and technical journals.

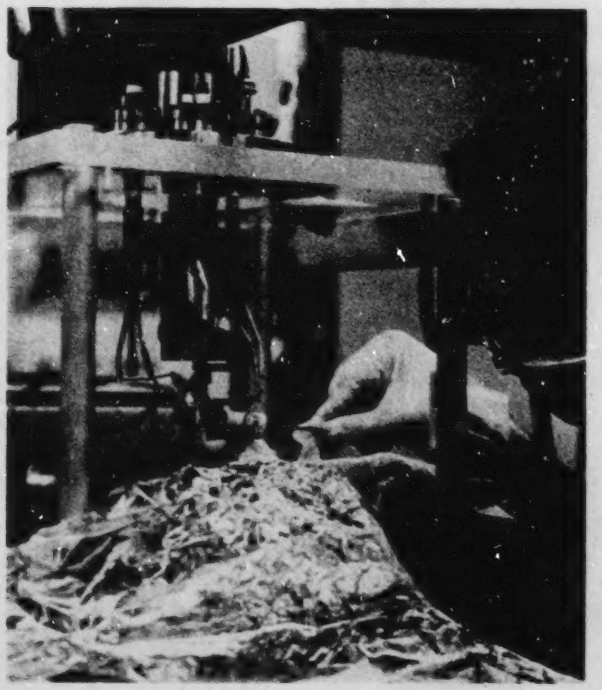
Equipment items can be purchased from grant funds, with the agreement of program officials. The program also operates a number of unique facilities, usually located at national laboratories, which are available for use by the user community. These include neutron scattering and diffraction facilities, electron microscopes, and the Lawrence Berkeley Laboratory National Center for Computation in Chemistry, a joint experiment with the National Science Foundation. Facilities that will be available in the future are the National Synchrotron Light Source at Brookhaven National Laboratory and the Combustion Research Facility at the Sandia National Laboratory at Livermore.

Nuclear Science

The Nuclear Science program is carried out under two distinct activities: Low Energy Nuclear Science and Isotope Preparations.

Both basic and applied studies are carried out under the nuclear research program. The major research effort directed toward improving the understanding of the atomic nucleus is included under the Nuclear Physics program. However, important contributions are made under the Nuclear Science program through use of low energy light ion beams from accelerators and neutrons from research reactors. These particles are used as probes to "feel" the atomic nucleus, to alter it or to break it up. Through study of the changes to the nuclear probe after an encounter with a nucleus and study of the products of a nuclear reaction, one can obtain information about what goes on inside the atomic nucleus.

Research under the Nuclear Science program also serves the nuclear energy technologies. Experimental research using neutrons and accelerated charged particles is pursued to obtain nuclear data needed in support of both the fission and fusion energy programs. This information on the interactions of neutron and charged particles with various materials, as well as nuclear structure and decay data, are compiled, evaluated, stored and disseminated.



A broadly based research program for the study of the chemical and physical properties of heavy radioactive elements (e.g., americium, curium, californium) is also included under the Nuclear Science program. Studies of their behavior are performed in aqueous and nonaqueous solutions important to nuclear waste processing technology. These research activities are largely carried out at the national laboratories.

Materials Sciences

Research conducted under the Materials Sciences program is aimed at understanding materials properties and phenomena of importance to all energy systems. Materials often are the key limiting factor in the development of new systems, the performance of present systems, and the evolution of advanced concepts. In the Materials Sciences program, emphasis is placed on areas where problems are known to exist or are anticipated, and improved understanding of materials properties is sought in areas where significant improvements in performance and, therefore, economics depend on the selection of materials and design.

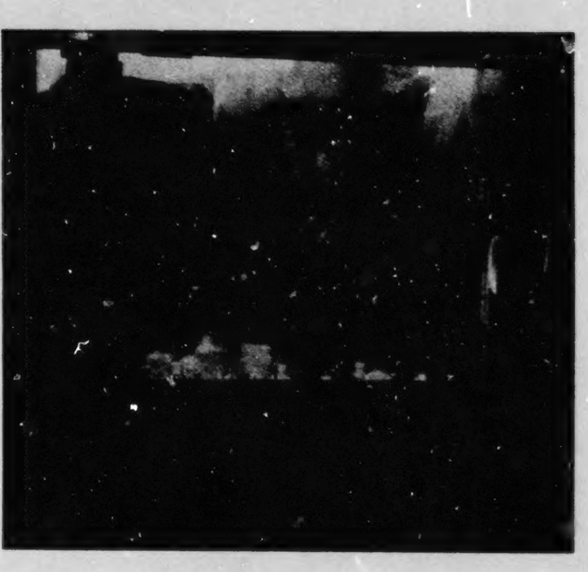
The Materials Sciences program is carried out in three topical areas: metallurgy and ceramics, solid state physics, and materials chemistry; and the disciplines associated with these areas are brought to bear on problems relevant to energy systems. Some of the research conducted under this program is important primarily to a single energy technology (e.g., studies of catalytic materials of interest to coal conversion), whereas other research is applicable to many technologies (e.g., studies of brittle fracture of structural materials). In addition, fundamental research is under way to provide long-term advancement of science which can serve as the foundation for future technologies (e.g., neutron scattering). This latter research often involves unique facilities and expertise available only at DOE laboratories.

Much of the research is conducted at the DOE multiprogram laboratories in close proximity to DOE applied research programs. In addition, research is conducted at universities and, to a lesser extent, in industrial firms, taking advantage of the unique expertise of researchers at each of the different types of institutions.

Chemical Sciences

Under the Chemical Sciences program, research is conducted in areas of chemistry, chemical engineering and atomic physics—both to provide a basis for the solution of current energy technology problems and to open new concepts for future development. The data and understanding that this program produce are of the kinds that can help make economically viable such newly developing energy technologies as coal liquefaction, or can help make possible other technologies such as fuel-making solar cells.

Research in the chemical sciences is conducted in two topical areas: fundamental interactions, and processes and techniques. The fields of research include solar-related photochemistry, chemical physics, physics of combustion, fusion-plasma-related physics (nonnuclear aspects), chemical con-



stituents and conversion behavior of coal, basics of catalytic effects in forming fuels, chemical methods for separating useful from hazardous substances in nuclear or fossil technologies, analytical techniques and basic chemical engineering of particulate beds fluidized by gas flows for combustion or gasification.

Engineering, Mathematical and Geosciences

Basic Energy Sciences programs in the engineering, mathematical and geosciences are still in the process of being developed to levels required to provide adequate long-range support for the Department's energy research and development activities.

A program of basic engineering research was initiated in 1979. The broad objectives of this program are to add to the store of fundamental knowledge for advancing energy-related engineering practices, to stimulate new engineering approaches to solving the Nation's energy problems, and to enhance the intellectual base for future energy-related engineering developments.

Areas being emphasized include: 1) tribology—surface fluid interactions, bearings, automobile tires, vibration-induced wear; 2) percolation—modeling of flows through porous media with applications to geothermal resources, and waste disposal, etc.; 3) automation and process control—on-line optimization and control, large-scale systems methodology; measurement methodology and instrumentation technology for hostile environments; 4) heat transfer and heat exchangers—heat pipes; techniques, components, and processes for heat exchangers; turbulent flow and vibrations; and radiative and convective heat transfer; 5) structural engineering materials—elastoplastic deformations and crack propagation in engineering structures; instrumentation and signal processing for nondestructive evaluation and testing; and 6) combustion—innovative approaches to modeling of combustion processes in stationary and mobile power plants.

Applied mathematical sciences is the focal point in DOE for advancing the state of the art in mathematical, statistical and computer sciences. Concepts, methodologies and tools usable by all technology programs are developed. Work in the applied mathematical sciences makes contributions to energy technology development in a number of areas, including accurate predictions of

the feasibility, safety, reliability, and efficiency of energy systems; and credible forecasts of energy supply and demand. The applied mathematical sciences program focuses on problems fundamental to the development, analysis, and use of large-scale computational models. Highest priority is assigned to research involving the applicability of computational models to previously intractable problems; improved reliability of computational models; and greater validity of the data required for modeling. A parallel emphasis is given to research contributing to more effective use of DOE computing resources.

Geoscience activities are selected for their likely impact on energy systems. Typically, studies of the behavior of hot geothermal brines and of hot dry rock when contacted by water are being conducted. Seismic research is under way for purposes of locating and assessing the magnitude of lava bodies, and to increase the understanding of earth movements which may affect choices of sites for energy-producing installations. The activities include the only serious effort to examine the potential and techniques for extracting energy from lava bodies under the earth's surface. Geochemistry work is included to develop scientific bases for predicting such effects as migration of nuclear wastes in the earth's crust.

Biological Energy Research

Within the last year a research program in biological energy conversion and conservation was established within the Office of Basic Energy Sciences. The program is directed toward conducting fundamental research on biological phenomena which may ultimately impact on new or developing energy technologies. Examples of these are: the improvement of production and conversion of biomass to fuels and chemicals, and utilization of wastes and residues for bioconversion to usable materials. Also to be included are exploratory studies for using biological processes as a means of recovering resources that would otherwise be unavailable because of energy intensiveness of other recovery processes.

The Biological Energy Research Program focuses principally on botanical and microbiological research. Currently included in the program are basic studies on photosynthesis, biological production of hydrogen and hydrocarbons, genetic and biochemical mechanisms of regulation of carbon metabolism in plants, adaptive mechanisms in plants and microorganisms allowing growth under suboptimal conditions, nitrogen fixation, mechanisms of methane production in microorganisms, and growth and development regulation in plants and biological systems that might play a role in reducing energy consumption by substituting for petrochemical use.

Beyond these activities, fundamental research is anticipated in microbiological studies on processes related to the conversion of materials such as cellulose and lignite into fuels (methane and ethanol) and usable chemicals, as well as the prospects of genetic alterations of systems to enhance conversion efficiency. Biochemical and physiological studies of anaerobic microorganisms will also be emphasized.

Advanced Energy Projects

The objective of this program is to support exploratory research on new energy-related concepts that require a proof of scientific feasibility and, where appropriate, an indication of economic viability. The Advanced Energy Projects program differs from other programs within the Office of Basic Energy Sciences in that it does not support sustained, evolutionary research efforts. Instead, it supports projects for a finite period of time, typically not exceeding three years, with a well-defined objective of either proving or disproving the validity of the proposed new concept. Whereas uncertainty of success for any given project is acceptable as a high risk, an indication of a high potential payoff is required to justify funding. This program also seeks to accelerate the transition of technology, for which engineering feasibility has been proven, to the appropriate project organization within DOE for further development.

Examples of projects supported include: new methods for direct conversion of heat to electricity; new methods for accelerating charged particles; new radiation sources with unusual characteristics (channeling radiation, x-ray lasers); extraction of oil from tar sands by radio frequency heating; new schemes for efficient heat engines; "exotic" photovoltaic materials; and others.

Some of the projects successfully completed under Advanced Energy Projects are then developed to a level approaching technological maturity by Advanced Technology Projects, a separate program within the Office of Energy Research, but not part of the Office of Basic Energy Sciences.

Program Information Contacts

Mailing Address: U.S. Department of Energy
Mail Station J-309
Washington, D.C. 20545

Nuclear Sciences	E. T. Ritter	(301) 353-3613
Materials Sciences	D. K. Stevens	(301) 353-3427
Chemical Sciences	E. S. Pierce	(301) 353-5804
Engineering, Mathematical and Geosciences	J. S. Coleman	(301) 353-5822
Biological Energy Research	R. Rabson	(301) 353-2873
Advanced Energy Projects		
— Exploratory Energy Concepts	R. Gajewski	(301) 353-5995
— Advanced Technology Projects	R. Kostoff	(202) 252-2725

Selected References (Available by request)

1. Program Information, Office of Basic Energy Sciences
2. Program Description, Biological Energy Research
3. Program Description, Advanced Energy Projects
4. Program Description, Engineering Research
5. Description of Mathematical Sciences Program Elements
6. In addition, 200-word summaries of the research sponsored are available for:
   - Materials Sciences
   - Chemical Sciences
   - Geosciences

Technical Assessment Projects

Program Objective

The Technical Assessment Projects provide for rigorous assessment of existing or proposed technological initiatives in the Department, and for examination of the base of research that underlies a broad range of energy technologies. The program also provides independent technical advice to the Secretary on the conduct of DOE research and development programs, in order to help make them more effective. Recent assessment studies undertaken included a critical evaluation of research needs in support of coal liquefaction, an evaluation of research and development programs in support of the ocean thermal electric systems, battery storage, advanced isotope separation technologies, and applications of robotic technology to nuclear system maintenance.

Problem Areas Requiring Additional Research

- Evaluation of chemistry of physics of coal; and
- Study of long-range research needs in coal oil shales.

Potential Areas for New Research Initiatives

- Carbon dioxide effects forecasting;
- Space-to-ground microwave transmission phenomena;
- Unconventional gas resource evaluation; and
- Novel approaches to liquid fuels from biomass and fuels for transportation.

Program Information Contact

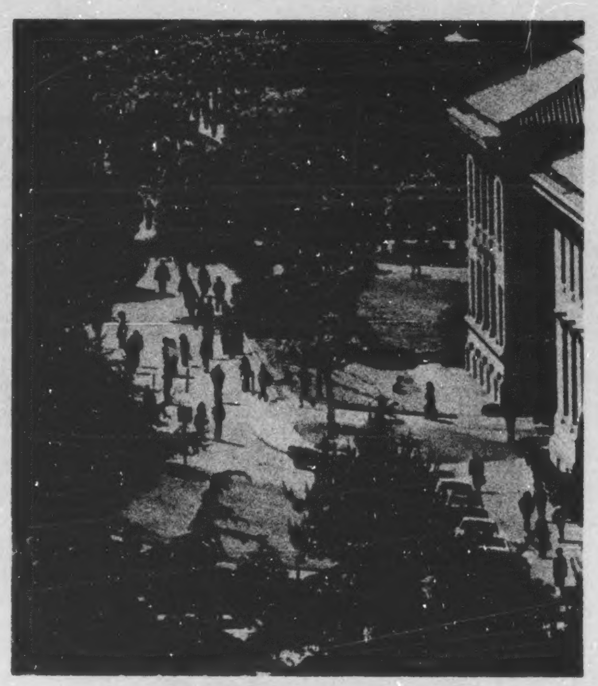
John Powers, (301) 353-2651

University Research Support

Program Objective

In addition to providing substantial support for specific university research efforts, the Office of Energy Research administers several special-purpose university support programs that cut across DOE program areas and the disciplinary or departmental structures of universities themselves:

- The Minority Institutions Research and Education Program supports energy research and education projects by faculty members and graduate students at smaller, traditionally minority schools. In 1980, eleven research projects are being supported totaling $650,000. In addition, 200 minority high school students are being supported in research apprenticeships at various DOE National Laboratories and in universities.
- The University Institutional Energy Research Program provides modest support for seed-type exploratory research projects, workshops and



seminars at a small number of universities with significant institutional strength in and commitments to energy. During 1980, six projects are being supported in this program totaling $1.8 million.

- The University Reactor Fuel Assistance Program provides financial support to colleges and universities to maintain nuclear research and training reactors. In 1980, $1.7 million will be obligated under this program.
- The University Laboratory-Cooperative Program includes a variety of activities that bring college and university faculty and students to DOE laboratories and Energy Technology Centers to participate in ongoing research programs and intensive instructional sessions on energy-related topics. During 1980, this program provides $2.8 million to support over 1,000 students and faculty members. Additional information on this program may be obtained by contacting staff members at participating DOE national laboratories.

Problem Areas Requiring Additional Research

- Long-range research on potential new technical options for future energy programs; and
- Research on important national and regional energy issues.

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[illegible]	1.9	2.3	4.7
[illegible]	4.0	4.8	9.6
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[illegible]	5.9	7.1	14.3
[illegible]	5.9	7.1	14.3

Program Information Contact

Richard Stephens, Director, Division of Institutional Programs
Dial DOE locator (202) 252-5000 for current telephone number.

References

1. Interim Guidelines for University Institutional Agreements Program, (available on request).
2. Information Guide on University/Laboratory Cooperative Program, DOE/ER-0007.

Magnetic Fusion Energy

Program Objectives

The DOE fusion program consists of two activities—the unclassified magnetic fusion energy program, which is assigned to the Office of Energy Research, and discussed here, and the partially classified laser fusion program cited under Defense Programs.

The primary goal of the Magnetic Fusion Program is to develop the technology for safe, economic and environmentally acceptable use of fusion power for the generation of electricity. A secondary goal is to develop and evaluate other applications of the fusion process including the production of fissile material, synthetic fuels and industrial process heat. To achieve these goals, the program has established several objectives which are:

- To develop, through definitive experimental tests of key physics questions, a strong scientific base necessary for the design of a fusion engineering test facility;
- To complete construction and initiate operation of major physics scaling experiments including the Tokamak Fusion Test Reactor and the Mirror Fusion Test Facility;
- To select; test and provide an assessment of alternate fusion concepts that could potentially lead to more economical and commercially practical fusion reactor systems;
- To provide the base engineering and technology developments needed to support the operation of current and next generation plasma experiments;
- To complete reactor studies of the most promising confinement concepts in order to provide a focus for the physics and technology programs; and
- To establish a strong technology base in materials, reactor components and systems which will permit an evaluation of various approaches to fusion on the basis of technology requirements, economic objectives and environment/safety constraints.

Problem Areas Requiring Additional Research

- Physics of plasma heating and confinement;
- Plasma diagnostics;
- Atomic physics of plasma impurities; and
- Improved superconducting materials.

Potential Areas for New Research Initiatives

- New fusion concepts; and
- Plasma-surface interactions.

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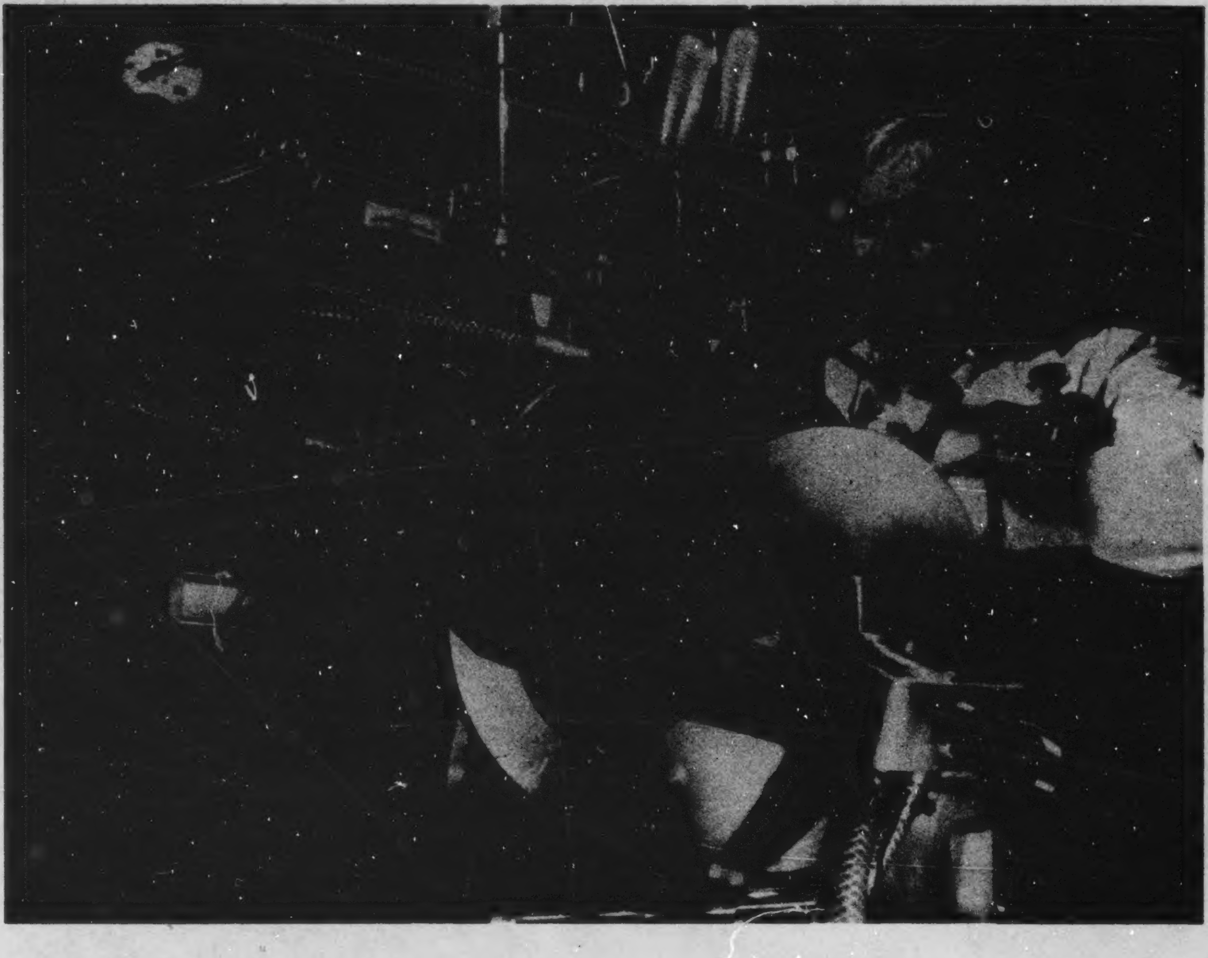
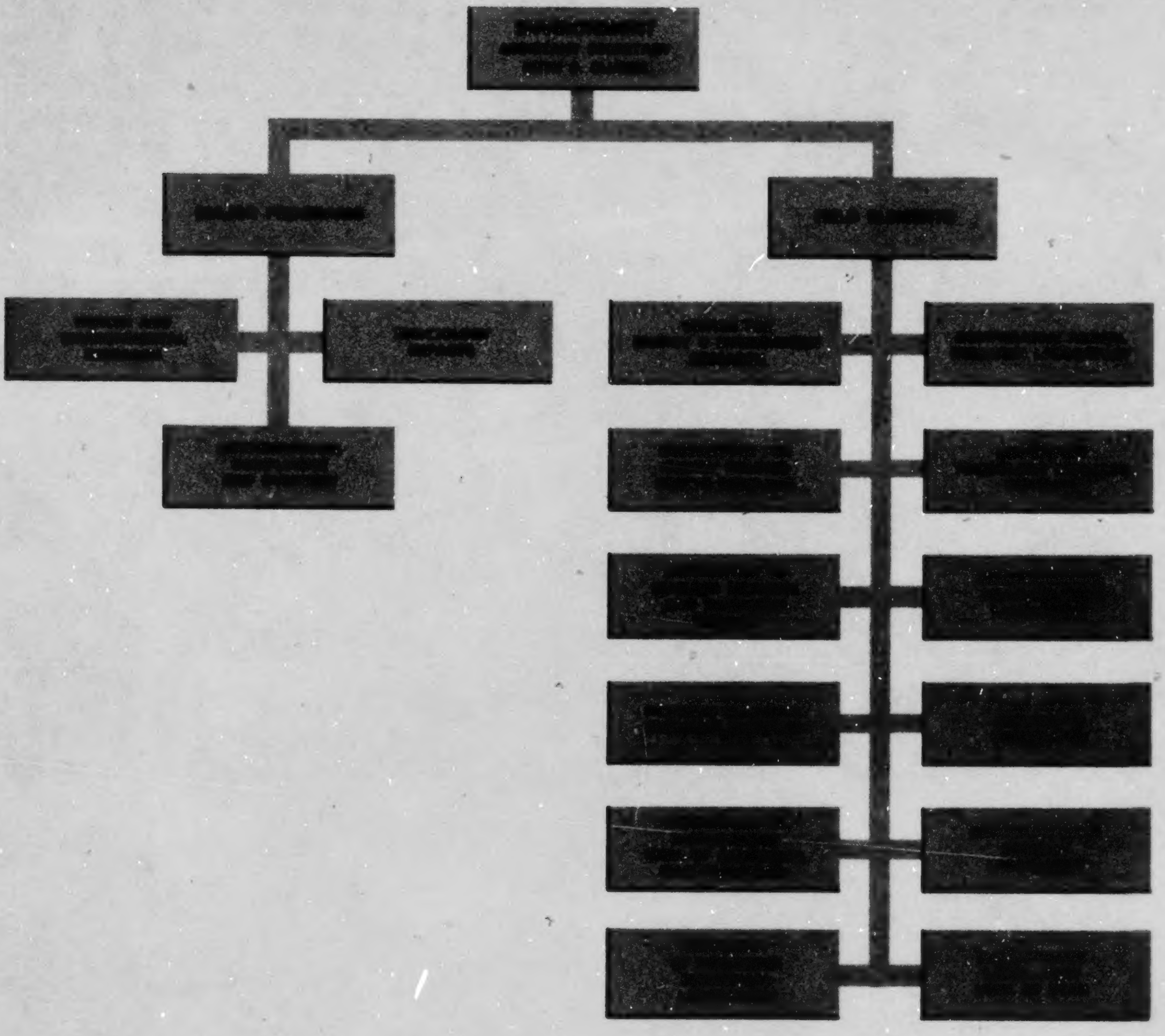


Program Information Contacts

Applied Plasma Physics	J. F. Decker	(301) 353-4596
Development and Technology	F. E. Coffman	(301) 353-5378
Mirror Confinement Systems	W. R. Ellis	(301) 353-2848
Tokamak Confinement Systems	N. A. Davies	(301) 353-4095

Environment



General Description

The Assistant Secretary for Environment is the principal environmental officer of the Department of Energy and is committed to implementing environmental policies that permit the Nation to search out options for solving its energy problems with minimal environmental impact. The Office of Environment supports the energy program offices in identifying environmental health and safety issues and in fulfilling environmental responsibilities. The Office conducts comprehensive health and environmental effects research and development programs and overviews DOE environmental performance to ensure compliance with internal and external environmental health and safety requirements including the National Environmental Policy Act.

To achieve its mission the Office of Environment establishes and maintains active communication and liaison with organizations concerned with environmental health and safety matters within the Department and its field organizations; with other Federal, state and local agencies; and with other national and international organizations. Environmental planning and review mechanisms are of two types, generic and specific, for which appropriate documents are developed. These documents include: Plans, Environmental Readiness Documents, Environmental Impact Statements or Environmental Assessments, Project Environmental Plans and the Safety Analysis System.

The environmental mission is a joint responsibility of both the energy program offices and the Office of Environment. The program offices conduct research and development to resolve issues and prepare National Environmental Policy Act documents, whereas the Office of Environment identifies environmental health and safety issues and conducts comprehensive health and environmental effects research and development.

The three major program offices in Environment perform the general functions of environmental compliance and overview, technology impacts assessment, and health and environmental research. Three programs of interest to users of this document are described below.

Field Elements

Environment also has cognizance over the radiological and biomedical laboratories listed above. Additional details concerning the functions of these facilities can be found in Reference 11 (page 97).

General Program Information Contact

Jeff Swinebroad, Director, Office of Program Coordination, (202) 252-4620

Health and Environmental Research

Objectives

The Office of Health and Environmental Research supports a broad multidisciplinary program in basic and applied life sciences research. The objectives of this research effort are to obtain fundamental biological information on the organization, structure, and function of living organisms and their environment; to determine the health and environmental impacts of energy technology developments on humans and their environment; and to develop new and improved techniques for use of stable and radioactive isotopes for application in research and clinical nuclear medicine practices for diagnosis and treatment of human diseases.

Problem Areas Requiring Additional Research

- Development and validation of models for dispersion of pollutants in complex terrain;
- Mechanistic studies on the relations and fate of organic materials introduced into the atmosphere;
- Development of improved pollutant measurement instrumentation with emphasis on methods for measurement of organic materials;
- Determination of causes and effects of acid rain;
- Development of personal meters and other techniques for assessing exposure to chemical emissions;
- Studies on marine and terrestrial sources as sinks for carbon dioxide from fossil fuel combustion;
- Modeling the atmospheric effects of increasing carbon dioxide;
- Reconstruction of past climate-carbon dioxide relationship;
- Determination of the mechanisms of environmental transport of pollutants through terrestrial and aquatic ecosystems;
- Determination of the stress of environmental pollutants upon ecosystems at all levels of organization;
- Recovery of landscapes following disturbance by energy-related development and achievement of stable ecosystems;
- Development of tissue- and organ-specific animal and human cell cultures;
- Clarification of the biochemical nature of DNA repair;
- Studies of mechanisms and structures related to observed toxic or genetic effects;
- Studies of the metabolic transformations of energy-related materials;
- Development of new theoretical and experimental approaches to prediction of human risk from experimentally derived data;
- Long-term surveillance of worker health involving new energy technologies such as synfuels and oil shale;
- Identification of the effects of increased fossil fuel pollutants on human health, and the prevalence and etiology of respiratory disease in the general public;
- Studies on indoor air pollution related to conservation measures for buildings and residences;
- Additions to present investigations of nuclear effects in Spain, the Nevada Test Site, and the Marshall Islands, including monitoring, protocol development and data analysis; and
- Development of epidemiological studies related to nuclear installations.

Potential Areas for New Research Initiatives

- The relative impact of natural and energy-related organic emissions on urban and regional air quality;
- Physical and chemical studies of atmospheric organic materials;
- Hydrologic studies in oil shale development areas in Colorado and in areas of synthetic coal development;
- Capacity of ecosystems to accommodate stress from energy development;
- Development of techniques to enable research data to be extrapolated to other regions;
- Development of techniques to establish measurements of the condition of the environment within every major region of the United States, especially in Alaska;
- Studies designed to develop new knowledge and techniques with potential for later application in evaluation of the health and environmental effects of energy development;
- New methods of detection of adverse human effects applicable to the early prevention or mitigation of such effects;
- Studies aimed at interactions which modify toxic, mutagenic and carcinogenic effects;
- Development of new methods and systems for direct in vivo/in vitro comparisons of chemical potency for toxic, mutagenic and carcinogenic agents;
- Effects of carbon dioxide-induced climate change and/or increased atmospheric carbon dioxide concentrations;
- Research on the social, political and economic consequences of global environmental change; and
- Assessment of the consequences of the carbon dioxide impact issue.

[redacted]

Program Information Contact

Director, Office of Health and Environmental Research
E-201, Germantown
U.S. Department of Energy
Washington, D.C. 20545

*Includes Life Sciences Research, Nuclear Medicine Applications and Biological and Environmental Research.

Technology Impacts

Objective

The assessment portion of the environmental research and development activity is designed to ensure that adequate emphasis is placed on environmental health and safety considerations in formulation and implementation of energy technology decisions, plans and progress. The assessment effort provides the basis for the overall planning of the biomedical and environmental research program in support of the energy technology research, development and demonstration programs.

Program Areas Requiring Additional Research

- Analysis of environmental policies, laws and regulations on energy development and use;
- Assessment and identification of environmental research and development required by DOE technology development programs; and
- Assessment of national and regional environmental impacts of DOE policies and programs.

Potential Areas for New Research Initiatives

- Environmental assessment of solar energy;
- Analyses of conservation, gasifiers-in-industry, oil shale, and enhanced gas recovery; and
- Special analyses pertaining to oil shale development and selected nuclear fuel cycles.

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Program Information Contact

Peter House, Director, Office of Technology Impacts, (202) 252-2061

Environmental Compliance and Overview

Objective

The Office of Environmental Compliance and Overview ensures that Departmental facilities and operations are in compliance with DOE operational policies and applicable Federal, state and local environmental, health and safety regulations and policies. The Office develops DOE National Environmental Policy Act guidance, conducts independent reviews of Departmental Environmental Impact Statements and reviews environmental impact statements of other agencies. It ensures that DOE-controlled activities do not pose undue risks to workers, the general public, property and the environment; develops policies and procedures for implementation and compliance programs; coordinates with programs within the Department; and monitors all Departmental installations and contractors for compliance. The Office promotes adequate environmental health and safety practices and assessments throughout the Department by maintaining current awareness of the state of the art and distributing such information to Departmental programs and contractors; evaluates the technical adequacy of environmental control technologies being developed for DOE energy systems; and evaluates and develops advanced safety engineering practices and tests.

Potential Area for New Research Initiatives

- Evaluation of the technical adequacy of environmental controls in the energy systems being developed by DOE.

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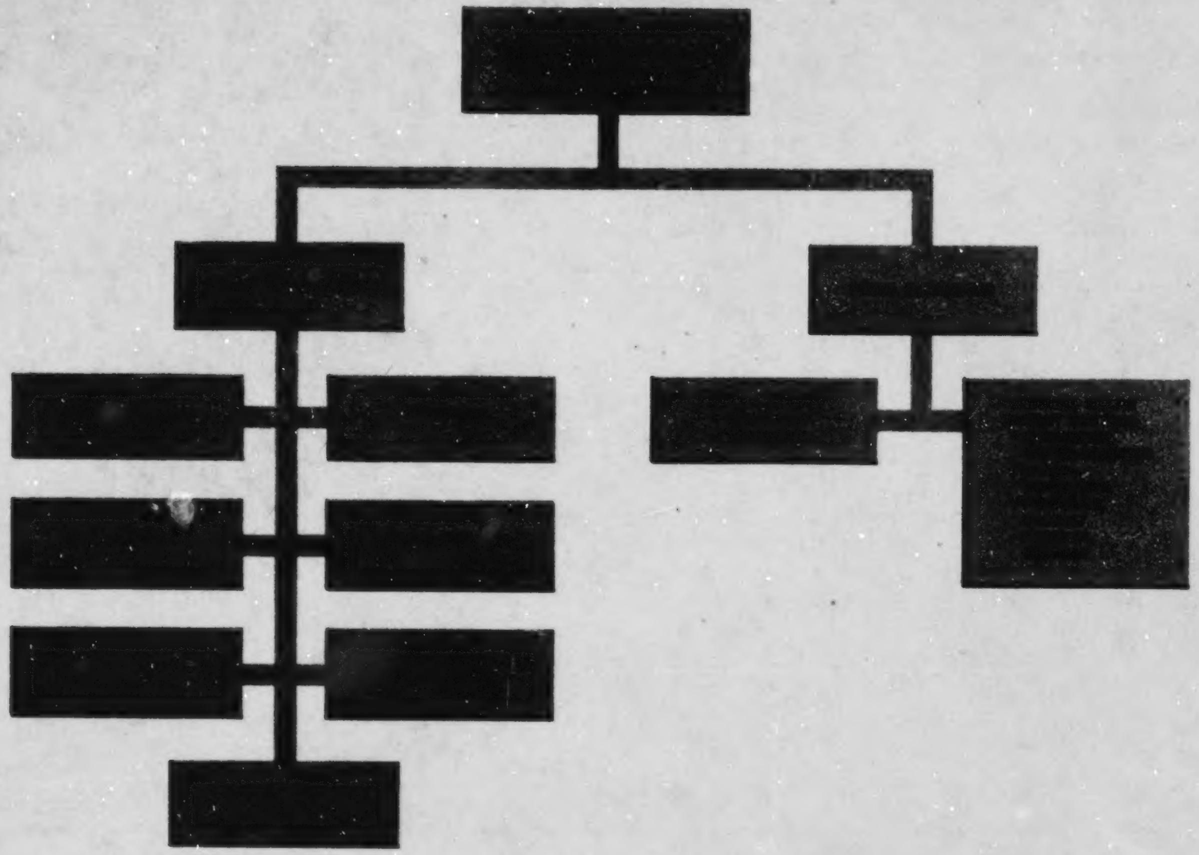
Program Information Contact

Director, Office of Environmental Compliance and Overview
E-201, Germantown
U.S. Department of Energy
Washington, D.C. 20545

Conservation and Solar Energy



General Description

The Assistant Secretary for Conservation and Solar Energy is charged with a dual responsibility to urge efficient use of the Nation's energy supplies and to encourage the widespread use of solar energy. The primary objective of this organization is to moderate the Nation's growing demand for petroleum-based energy. Conservation and Solar programs cover a broad spectrum of energy users: from research, development and demonstration of advanced technologies, to financial and technical assistance for conservation-related activities, to support for regulatory programs and technology transfer activities.

To achieve its mission, various Conservation and Solar Energy programs simultaneously stimulate the development and application of improved energy-efficient technology, and speed the introduction of programs, entailing higher risks and more potential for conservation than otherwise would be feasible, into the private sector. They also provide necessary research, development and demonstration to develop and commercialize renewable energy systems. Other programs enable selected public and private energy users, such as schools, hospitals and low-income persons to institute energy conservation improvements which would not be undertaken without Federal assistance.

The six programs for potential university and other research participation are described in the following pages.

Field Elements

- Solar Energy Research Institute, Golden, Colorado (Denis Hayes, Director)

The Solar Energy Research Institute began operations in July 1977. Its mission is to serve as the primary DOE institution for solar energy research, development and demonstration. The Institute's programs are designed to ensure the development of solar energy technologies to the point where they are capable of making significant, reliable contributions to the Nation's energy supply. Activities include program and project management; market analysis of solar technology; solar information dissemination; and the design and development of a Solar Information Data Bank. The Institute also supports research by universities and other organizations with funds provided by DOE headquarters.

- Regional Solar Energy Centers

The four Regional Solar Energy Centers were established to promote widespread solar energy utilization on a regionally diversified basis. The four centers, representing the Northeast, Mid-America, Western and Southern regions of the United States, are located respectively in Cambridge, Massachusetts; Eagan, Minnesota; Portland, Oregon; and Atlanta, Georgia. Funding for the Solar Energy Research Institute and the Regional Solar Energy Centers is provided through the Solar Energy Programs Office.

Buildings and Community Systems

Program Objectives

The Office of Buildings and Community Systems supports activities designed to increase energy utilization efficiency in commercial, residential and Federal buildings and in entire communities through use of integrated community energy systems. Its programs employ research, development and demonstration and other approaches to encourage the adoption of energy conservation and fuel substitution technologies. Vital to this endeavor are efforts to increase the use of urban waste as a source of energy, increase the energy efficiency of consumer products, and transfer energy-efficient technology to the private sector. Overall, the program will lead to increased energy efficiency in new and existing buildings by accelerating the use of new energy-efficient technologies in the construction and operation of buildings and building systems. To accomplish its goals, the Office of Buildings and Community Systems works closely with local governments, other Federal agencies, the construction industry and other elements of the private sector.

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Problem Areas Requiring Additional Research

- Building systems—require increased research in heat transfer, materials, structures and control technologies;
- Community systems—require work in systems analysis, thermodynamics, heat transfer, materials, structures, control technologies, combustion processes, and thermochemical/electrochemical processes as applied to community energy systems; and
- Urban waste technology—require basic and applied work in combustion processes, and chemical and biological fuel conversion processes.

Potential Areas for New Research Initiatives

- Development of new concepts in building thermal envelope systems to provide better insulation, less infiltration, control of sunlight, improved vapor barrier system and better weathering;
- Development of improved technology for combustion of urban waste;
- Determination of properties of insulating materials, including dependence of the properties on temperature, density and moisture;
- Development of new thermally activated heat pumps to use a wide range of liquid, gaseous and solid fuels; and
- Development of burners to use synthetic oil and gas fuels.

Industrial Programs

Program Objectives

The Industrial programs identify energy-conserving industrial techniques and sponsor cost-shared research, development and demonstration to develop and transfer this technology to the private sector. The programs are aimed at increasing energy utilization efficiency, substituting more abundant fuels for scarce oil and natural gas in the industrial and agricultural sectors, and minimizing energy loss in waste streams of all types. To complement these efforts, programs are maintained to monitor industry's progress toward im-

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Program Information Contacts

Buildings Design & Structure (Bill Gerhen)	(202) 252-9177
Community Energy Utilization (Edna Jones)	(202) 252-9391
Consumer Products & Technology (Mike Voorhies)	(202) 252-9125
Technology Transfer & Dissemination (Joyce Henderson)	(202) 252-9452

proved energy efficiency and to transfer existing and new technology to the private sector. The industrial programs will encourage an increase in the rate of adoption of energy conservation measures and investments by the industrial sector and will accelerate the introduction of higher-risk technologies which offer significant energy conservation potential.

Problem Areas Requiring Additional Research

- Waste energy utilization and cogeneration—need basic work in thermodynamics, heat transfer, materials, combustion processes, and thermochemical/electrochemical processes;
- Alternative materials utilization—needs basic research on physical properties and structures of proposed alternative materials;
- High and low temperature processes—need basic work in phase equilibria, metallurgy, solids flow, process control technology, and improved materials; and
- Agriculture and food processes—need basic research in nitrogen fixation, food preservation, and advanced food processing.

Potential Areas for New Research Initiatives

- Improvement of combustion efficiency through better control of turbulence and reaction rates;
- Research on the chemical kinetics of important processes, especially heterogeneous gas solid and gas liquid kinetics;
- Development of ceramics, metal alloys, and coatings for high-temperature applications;
- Development of research techniques that explore the chemistry and physics of membrane separation of air into nitrogen-rich and oxygen-rich streams;
- Development of nonthermal production processes for lime and cement;
- Development of models of the thermodynamic properties of important materials;
- Basic research in metal solidification processes, nature of coking phenomenon, basic mechanisms of ore grinding, and iron oxide reduction;
- Development of artificial photosynthesis techniques; and
- Development of advanced separation techniques for more efficient water purification, sterilization, concentration and crystallization.

Budget Data ($ Millions)	FY 79 B/O (est.)	FY 80 B/O (est.)	FY 81 B/O (est.)
Basic Research	0	0	0
Applied Research	0	0	0
Engineering, Demonstration and Commercialization	25.8	47.2	50.8
University R&D Support	2.1	1.2	2.0
Total Research and Development	25.8	47.2	50.8

Program Information Contacts

Waste Energy Utilization & Cogeneration (John Eustis)	(202) 252-2084
Alternative Materials Utilization (Jerome Collins)	(202) 252-2366
High Temperature Processes (Ralph Sheneman)	(202) 252-2084
Low Temperature Processes (John Rossmeissl)	(202) 252-2188
Agriculture & Food Processes (Larry Kelso)	(202) 252-2075

Transportation Programs

Program Objectives

The Transportation programs are aimed at reducing the total energy consumed by vehicles by encouraging research to develop advanced energy-efficient propulsion systems for trucks, buses and automobiles, with emphasis on the passenger automobile. High priority is given to the development and commercialization of the gas turbine, Stirling engines, and electric and hybrid vehicles; emphasis is also placed on the development of alternate fuels. Synthetic fuels can help to reduce petroleum consumption in the transportation sector. Other segments of this program augment the longer-range research, development and demonstration effort by encouraging the adoption of already available energy-efficient technologies and by instituting incentives that encourage people to buy energy-efficient automobiles. In addition, driver education programs are planned to inform people about energy-efficient driving practices.

Problem Areas Requiring Additional Research

- Vehicle propulsion—requires support from research in combustion, thermochemistry, thermodynamics, kinetics and materials science;
- Alternate fuels utilization—needs work in combustion thermochemical reactions and fluid mechanics applicable to coal and shale-derived fuels; and
- Electric and hybrid vehicles—could benefit from basic studies of chemical and electrochemical reactions; materials; structures; catalysis; kinetics; solid state physics; and magnetic and electromagnetic phenomena.

Potential Areas for New Research Initiatives

- Development of new concepts and techniques for assessing and formulating fuels from synthetic crude oil; research techniques that explore combustion kinetics; lightweight (nonferrous) permanent magnets of high specific strength and low cost; lightweight hydrogen storage materials or techniques for hydrogen-fueled vehicles; and data on composition of exhaust from combustion and synthetic fuels.

In addition, goal-oriented research related to battery development is needed in the following areas:

- Corrosion in battery and fuel cell environments;
- Ionic conductivity of solid electrolytes;
- Catalysts associated with air electrodes and hydrocarbon reformers;
- Material migration;
- Electronic conductivity of sulfur compound electrodes;
- Low-cost electronic insulators;
- Ambient temperature technologies not yet explored;
- Surface phenomena of porous electrodes; and
- Organic electrolytes for secondary batteries.

Budget Data ($ Millions)	FY 79 B/O (est.)	FY 80 B/O (est.)	[illegible]
Basic Research	0	[illegible]	[illegible]
Applied Research	0	[illegible]	[illegible]
Development, Demonstration and Commercialization	20.4	[illegible]	[illegible]
University R&D Support	[illegible]	[illegible]	[illegible]
Total Research and Development	20.4	[illegible]	[illegible]

Program Information Contacts

Gas Turbine (Terry Levinson)	(202) 252-8067
Alternative Fuels (Ralph Fleming)	(202) 252-8055
Electric and Hybrid Vehicles (Dick Miner)	(202) 252-8040

Solar Energy

Program Objectives

Solar Energy Programs encompass both solar applications and solar technologies. These programs and related policy initiatives are intended to stimulate accelerated commercialization, market acceptance and demand for solar products for residential, agricultural, and industrial heating and cooling processes in both public and private sectors. Technology programs are oriented toward the development of power generating systems that derive energy directly or indirectly from the sun by means of biomass, wind, ocean, solar thermal, and photovoltaics. Both the applied and the technological areas of solar energy programs seek to provide low-cost, renewable solar-related energy source systems.

Problem Areas Requiring Additional Research

Solar Applications

- Goal-oriented research on low-cost materials for collectors, thin film coatings, photochemical energy storage, and photochemical reactions for fuels;
- Theoretical and experimental studies of heat flow from buildings into the soil, natural convection flow patterns within buildings, and hydrodynamics in salt gradient ponds;
- Net energy analyses of solar system components;
- Feasibility study of thermionic converters using electrostatic lenses;
- Materials research for containerization of phase change salts;
- Research on inexpensive chemical storage systems, better and less expensive insulation for underground storage, and materials to enhance heat transfer rates in heat exchangers;
- Search for less costly, less toxic, longer-life heat transfer fluids;
- Development of inexpensive and easy-to-install "state of charge" meters for energy storage subsystems;
- Research on thermodynamic working fluids for solar cooling systems;
- Development of materials to serve as selective emitters and windscreens for passive cooling applications;
- Thermodynamic cycle analyses of innovative cooling cycles;
- Experimental determination of new working substances; and
- Accelerated lifetime testing of all solar heating and cooling system components.

Solar Technology

Ocean Systems

- Development of improved measurement of biofouling thermal resistance; and
- Study of kinetics of microbial film formation and evaluation of hydrophobic films for prevention of microbial deposits.

Photovoltaics

- Understanding of theoretical mechanisms occurring at grain boundaries of cells;
- Investigation of new and alternate photovoltaic cell substrata; and
- Development of low-cost cell encapsulation systems.

Biomass Systems

- Development of catalysts for gasification and liquefaction of woody biomass; and
- Development of efficient chemical and biological conversion of biomass into fuels.

Wind Energy Systems

- Analysis of electromagnetic wave interference and its effects on television reception and telephone line communications.

Solar Thermal Power

- Identification of new processes for production of products based on the use of solar thermal energy; and
- Development of a basic understanding of catalysis for industrially significant fuels, and chemical and photochemistry processes.

Potential Areas for New Research Initiatives

Solar Applications

- Development of a range of polymeric and other non-glass materials suitable for mass-produced collector glazings; and
- Development of phase change materials for thermal storage in various temperature ranges.

Solar Technology

- Development of analytical tools for extrapolation of measured wind characteristics data to sites lacking measured data;
- Development of materials, manufacturing processes and design data for mirror support

materials to include cellular glass, glass-reinforced concrete, composites, and wood products;
- Development of the technique for obtaining flaw-free high-strength edges on thin glass sheets; and
- Development of polymer films and sheets for second-surface mirrors.

Program Information Contacts

Solar Applications (John Schuler)

Wind Energy (Louis Divone)

Biomass (Sanford Harris)

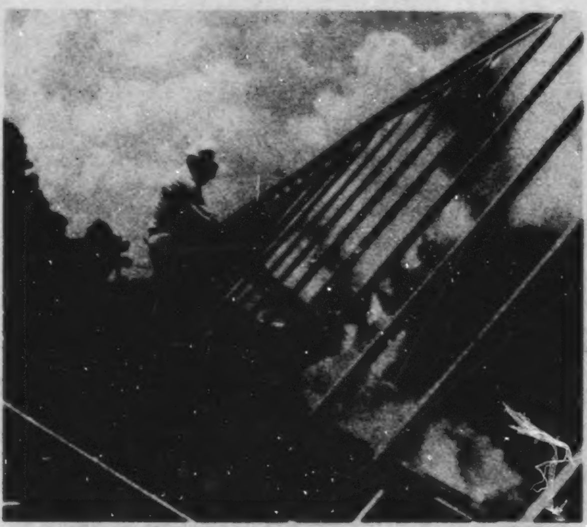
Photovoltaics (Paul Maycock)

Solar Thermal (Gerald Braun)

Ocean Energy (William Richards)

Dial DOE locator (202) 252-5000 for current telephone numbers.

Small Scale Technology



Program Objectives

The Office of Small Scale Technology conducts the Appropriate Technology Small Grants Program, a financial assistance program to fund the development of innovative energy conservation technologies and methods of utilizing community-level renewable energy resources. Individuals, small businesses, state and local governments, Indian tribes and nonprofit organizations are eligible to participate in the program, which awards development and demonstration grants of up to $50,000. The program is managed through the ten DOE regional offices (listed on page 99), which are responsive to local needs and concerns. A portion of these funds goes to university research and development projects.

Program Information Contact

Rex Williams

Dial DOE locator (202) 252-5000 for current telephone number.

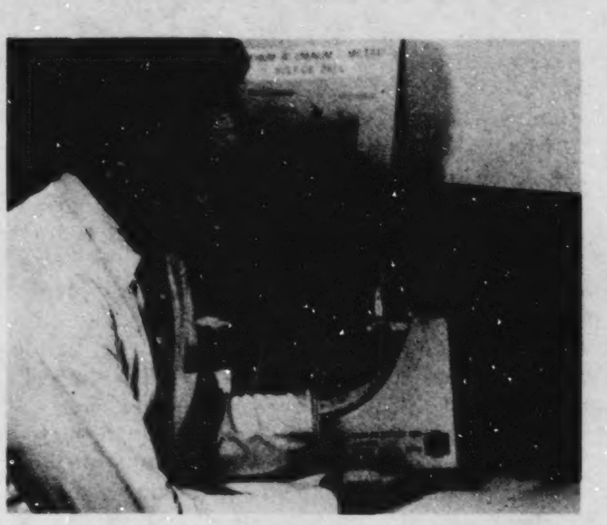
Energy Storage Systems

Program Objectives

Energy Storage supports end-use programs in their critical energy-saving and fuel substitution missions. When used in the link between energy source and end-use, storage can correct the timing mismatch between energy supply and energy demand found in most energy delivery systems. This is particularly important in the case of intermittent energy sources such as solar, or in production and delivery systems where demand fluctuates greatly, as with electricity.

The Energy Storage Program goals are: to increase the substitution of coal, nuclear and solar energy for petroleum and natural gas; to enable solar and other intermittent energy systems to provide continuous service; and to conserve energy by storing industrial and utility reject heat for later use and by improving the efficiency of electrochemical processes.

DOE is developing four major energy storage technologies: battery, mechanical, thermal and chemical energy storage. These technologies will be used throughout the U.S. economy in solar systems, transportation, building heating and cooling, industry and the utilities.



Problem Areas Requiring Additional Research

- Development of cost-effective batteries with high energy density, and peak power capacity as well as long cycle life for transportation, solar and utility applications;
- Development of new methods of hydrogen production from water, using heat or sunlight;
- Development of high-strength safe materials for flywheels used for body vehicle and stationary applications;
- Development of higher-temperature superconductors;
- Development of more efficient heat pipes and investigation into basic thermochemical reactions; and
- Development of a data base containing the thermophysical properties of materials used in energy storage systems.

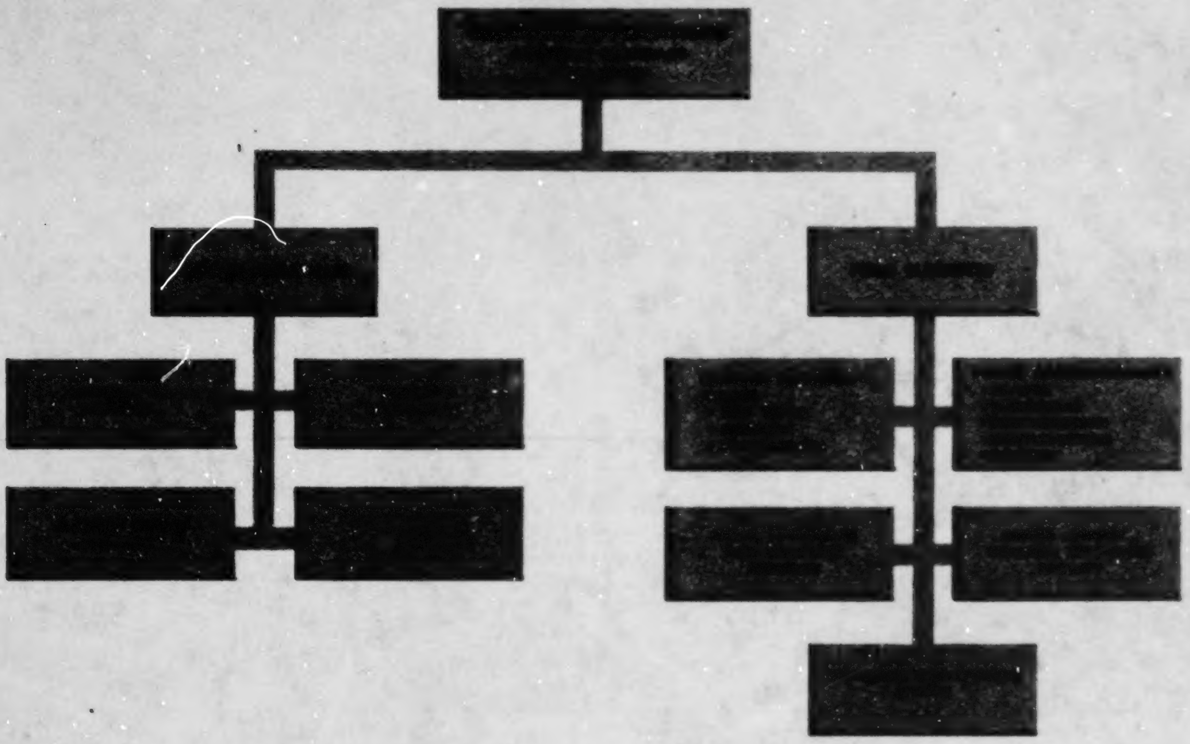
Potential Areas for New Research Initiatives

- Theory and properties of aqueous, nonaqueous and solid electrolytes;
- Membrane properties and characteristics of ion exchange materials;
- Structural aspects of electrolytic interfaces, particularly solid-liquid;
- Electric double layer phenomena at solid-liquid interfaces;
- Characteristics of mechanisms and rates of electrochemical reactions in electrolytic solutions;
- Electrocatalytic theory and material properties for increasing and controlling electrochemical reaction rates;
- Experimental methods and instrumentation in electrochemical kinetic theory research and development;
- Theory and characteristics of electrocrystallization and material dissolution;
- Electrolytic corrosion and passivation theory and technique for electrolytic materials treatment and stabilization;
- Mechanisms of electrophoretic deposition and materials characteristics;
- Electrochemical ion transport phenomena mechanisms and characteristics;
- High-strength flywheel materials development; and
- Thermochemical reactions and reactant properties.

Program Information Contact

Richard Jones (202) 376-9207

Resource Applications



General Description

The Assistant Secretary for Resource Applications is responsible for managing and coordinating an array of programs that affect the production or the supply of national energy sources, such as uranium, oil shale and geothermal.

This organization is the DOE focal point for introducing into the marketplace proven technologies that are environmentally acceptable and economically viable. The industrialization effort is conducted through the activities of several resource managers responsible for specific technologies which the Department has determined to have reached commercial readiness, e.g., atmospheric fluidized bed combustion.

The two Resource Applications programs having significant research initiatives of interest to university and related organizations are discussed in the following pages.

Field Elements

Field organizations administratively assigned to Resource Applications are categorized as production facilities, power administrations, and resource reserves. The organizations are described in Reference 11.

General Program Information Contact

Beverley Heffernan, Staff Assistant to the Assistant Secretary for Resource Applications
(202) 633-8262

Geothermal Energy

Program Objectives

The Division of Geothermal Energy provides overall direction for the planning, development, and implementation of all DOE research and technology development activities associated with geothermal energy. DOE in-house work on the program is concentrated at Lawrence Berkeley Laboratory and Los Alamos National Scientific Laboratory.

Problem Areas Requiring Additional Research

- Analysis of existing geoscience data in areas where geothermal resources are believed to exist but where probable geothermal reservoirs have not been specifically identified;
- Design and development of simulators and test procedures for measuring present geothermal reservoir production performance and predicting future performance; and
- Development of materials and equipment resistant to the high temperatures and corrosive conditions prevalent in geothermal environments.

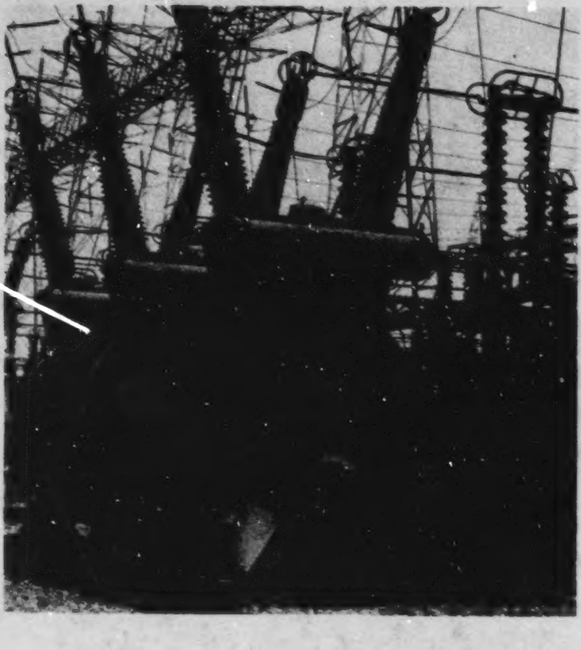
Potential Areas for New Research Initiatives

- Development of new techniques for locating and assessing geothermal reservoirs;
- Acquisition and analysis of new geologic, geochemical and geophysical data in areas where preliminary analyses indicate a promising geothermal resource;
- Development of equipment and techniques for retrieving technical information from geothermal downhole environments; and
- Development of new technical approaches for the amelioration of adverse environmental impacts of geothermal energy utilization.

[redacted]

Program Information Contact

Bennie G. DiBona, Director, Division of Geothermal Energy, (202) 633-8909.



Electric Energy Systems

Program Objectives

The Division of Electric Energy Systems has as its primary concern those technologies relevant and applicable to U.S. electric energy systems. The division is developing a broadly based research, development and demonstration program in electric energy systems with the long-range goal of developing an effective integration of new technologies, such as solar energy, into the Nation's electric energy network; and of providing options for increased power transfer capability over existing and future transmission rights-of-way. The division fulfills an important role in tying together the energy source and end-use electric energy technologies. The broad overall objective of the program is to help ensure that the Nation's electric energy system is capable of meeting future demands reliably, with the lowest practicable energy losses and maximum energy conservation, and in accordance with environmental and National Energy Policy principles.

Problem Areas Requiring Additional Research

- Develop means to transfer large blocks of electrical energy during both normal and emergency periods and as a backup for dispersed solar electric sources;
- Provide technical support for national regulatory policy in reliability, wheeling, pooling and conservation; and
- Conduct reliability research and development to support Economic Regulatory Administration requirements.

Potential Areas for New Research Initiatives

- Provide technical options to relieve the transmission corridor siting problem;
- Develop system planning and control methods required for the integration of dispersed generation, storage and load management technologies into the existing and future electric energy network; and
- Test for grid-related interactions with concepts such as load management, central storage systems and widespread use of intermittent generation technologies.

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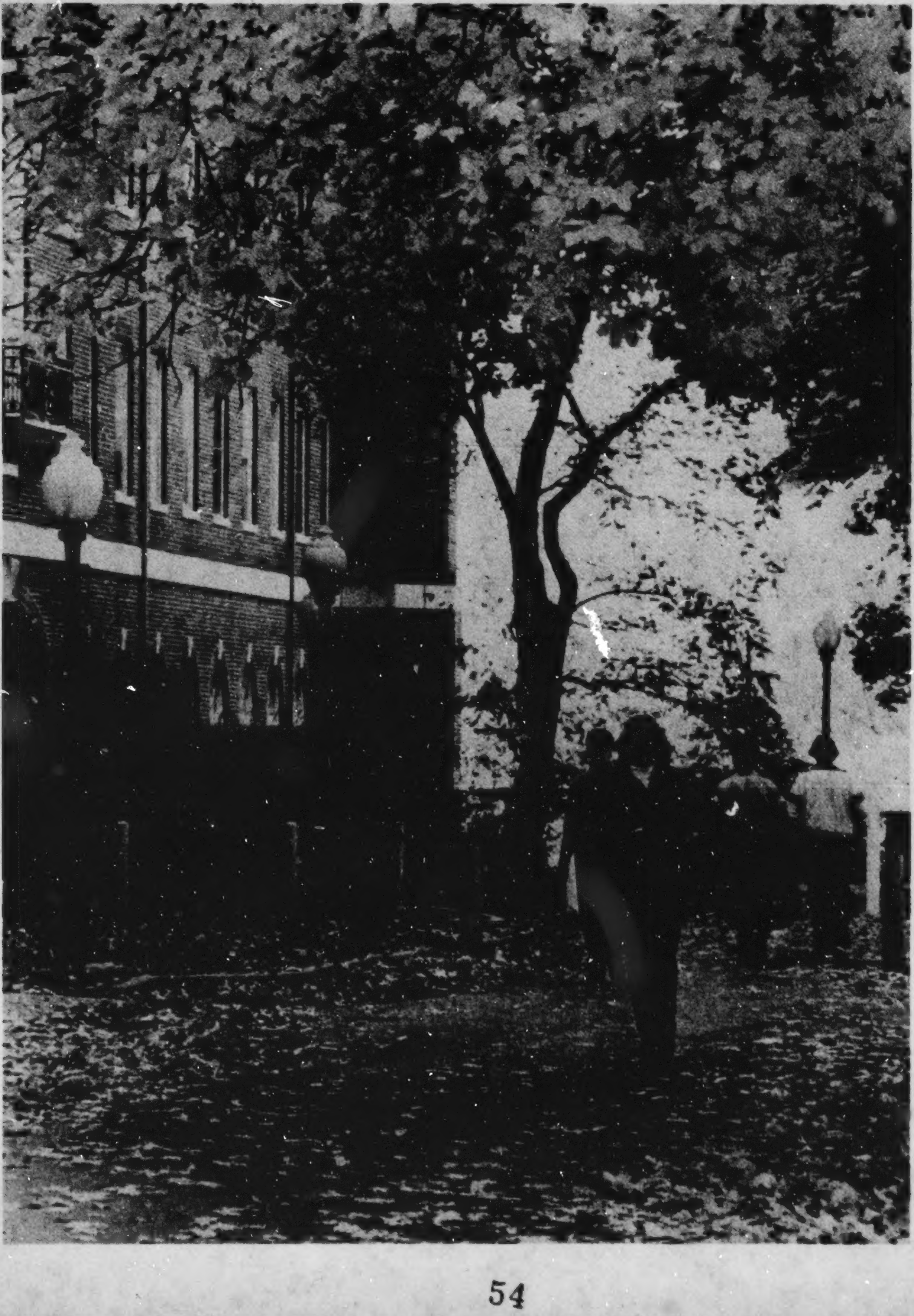
[illegible]	[illegible]	[illegible]

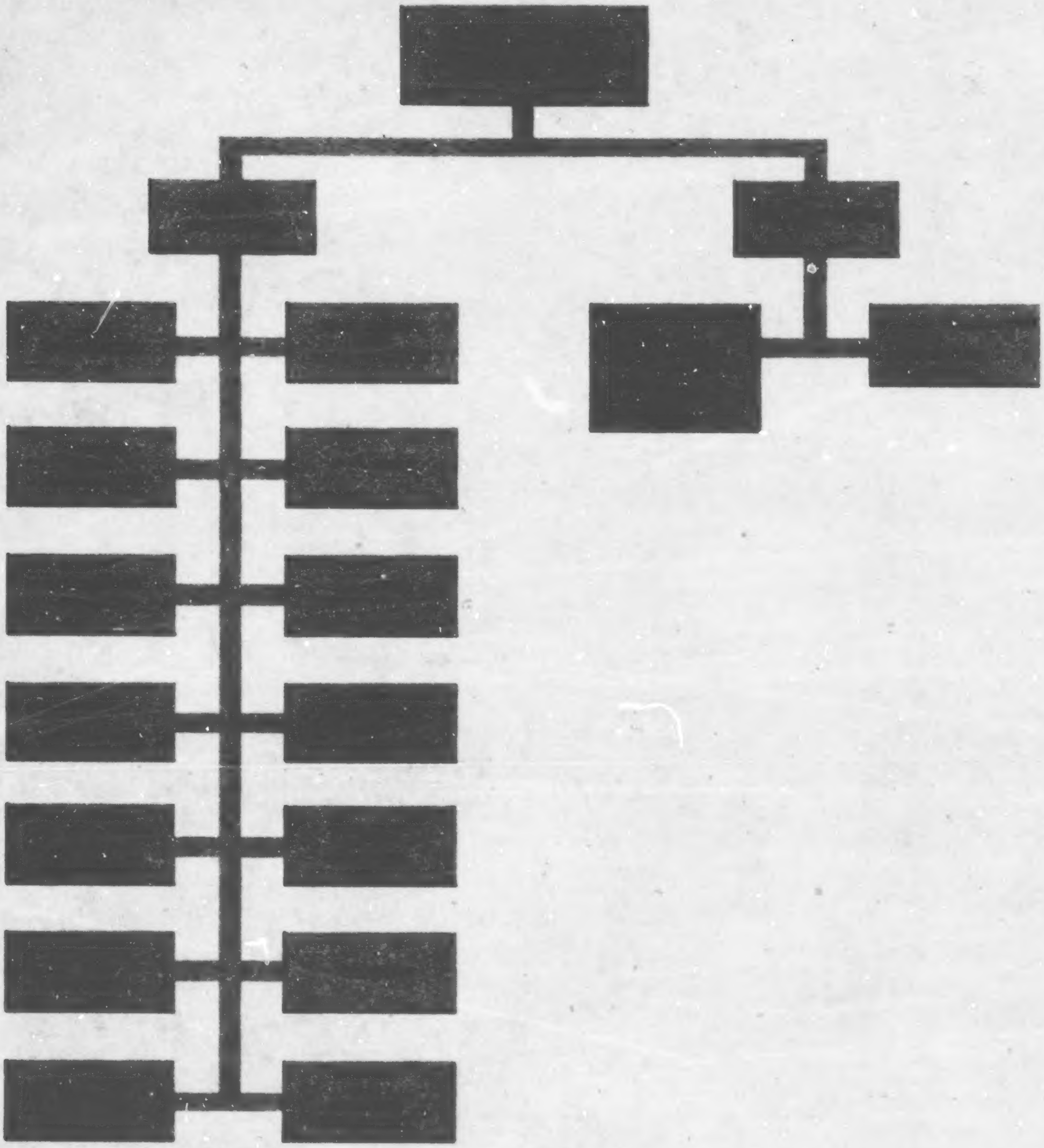
Program Information Contact

F. Fox Parry, Director, Division of Electric Energy Systems, (202) 633-8777

References

Third Annual Program Information Notice, July 1979, DOE/ET-0106, NTIS.





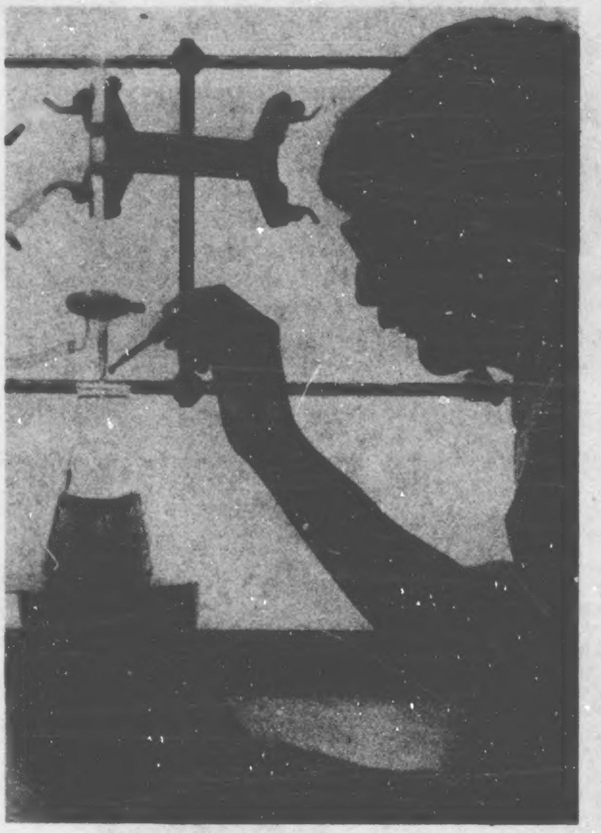
General Description

The mission of the Fossil Energy Program is to develop technologies that will increase domestic production of oil and gas or that will permit the Nation to shift from oil or gas to more abundant coal. Specifically, the Fossil Energy role is to develop technologies to support the following objectives:

- Provide a capability to convert coal to liquid and gaseous fuels;
- Increase domestic production of coal, oil and gas;
- Ensure that current and new facilities that burn coal can do so in an economically viable and environmentally acceptable manner; and
- Allow more efficient and more economically attractive utilization of fossil energy resources.

The Fossil Energy activity includes fourteen major programs, which are grouped under seven program offices and discussed in the following pages. One of these seven is the Office of Advanced Research and Technology, which is the central point of contact for inquiries from universities concerning the Fossil Energy program.

Project execution and technical monitoring are administered in five energy technology centers and two mining technology centers. These centers are described on pages 79 and 80. Lead missions assignments in Fossil Energy are as follows:



Low/Medium Fuel Gas Demonstration Plants	Chicago Operations Office
Solvent Refined Coal Demonstration Plants	Oak Ridge Operations Office
Magnetohydrodynamics Engineering Test Facility	(To be determined)
High-Btu Pipeline Gas Demonstration Plants	Headquarters

General Program Information Contact

Robert Wellek, Office of Advanced Research and Technology, (301) 353-2784

References

1. Fossil Energy Program Summary Document, March 1979, DOE/ET-0087, NTIS.
2. Fossil Energy University Contracts Summary Book.

Coal Utilization

Program Objective

The activities of this program emphasize furthering the development of technologies that would allow greater coal use in the near term; these are flue gas cleanup systems, coal-oil mixtures and atmospheric fluidized bed combustion. In addition, research and development is supported on advanced coal utilization technologies, such as fuel cells, combined-cycle gasification, pressurized fluidized bed combustion, cogeneration, combustion of synthetic liquids, and novel combustion processes.

Areas Covered by Current Projects

Technology Development

- Integrated coal gasification and combustion systems; open-cycle and closed-cycle electrical generation systems;
- Heat recovery components and systems, to include low-grade (up to 200° F) and high-grade (above 200° F) heat recovery and heat exchanger technology;
- Atmospheric and fluidized bed combustion systems;
- Engine combustion, and improved gas and oil burners; and
- Alternate fuel utilization, including coal-oil mixtures.

Research

- Fluidized-bed combustion;
- Synfuel combustion;
- Pulverized coal combustion;
- Heat exchanger technology;
- Coal/oil slurry development and combustion;
- Advanced flue gas desulfurization;
- Thermal transfer in power conversion systems;
- Fuel cell oxygen electrodes;
- Fluid dynamics in coal combustion systems;
- Hot gas cleanup;
- Solid waste utilization;
- Environmental studies; and
- Development of combustion diagnostics.

[redacted]

Program Information Contacts

Pulverized Coal Combustion —James D. Hickerson (412) 675-6000
(Pittsburgh Energy Technology Center)

Fluidized Bed Combustion —James S. Harlow (304) 599-7519
(Morgantown Energy Technology Center)

Other Areas —Stephen M. Wander (301) 353-4718

Coal Processing

Program Objective

The Coal Processing program consists of two main activities—coal liquefaction and gasification. The objectives of coal liquefaction are to develop to the point of commercialization:

- Existing technology to convert domestic coal into clean boiler fuel, distillate heating oil, gasoline, and chemical feedstocks; and
- Novel processes in bench scale units.

The overall objective of the gasification activity is to develop and demonstrate, in cooperation with industry, environmentally acceptable technology needed to gasify coal. The produced fuel gases of low/medium-Btu heating value can be used directly for chemical feedstocks or in coal liquefaction processes. High-Btu gas of pipeline quality can be used to supplement U.S. natural gas supplies.

Areas Covered by Current Projects

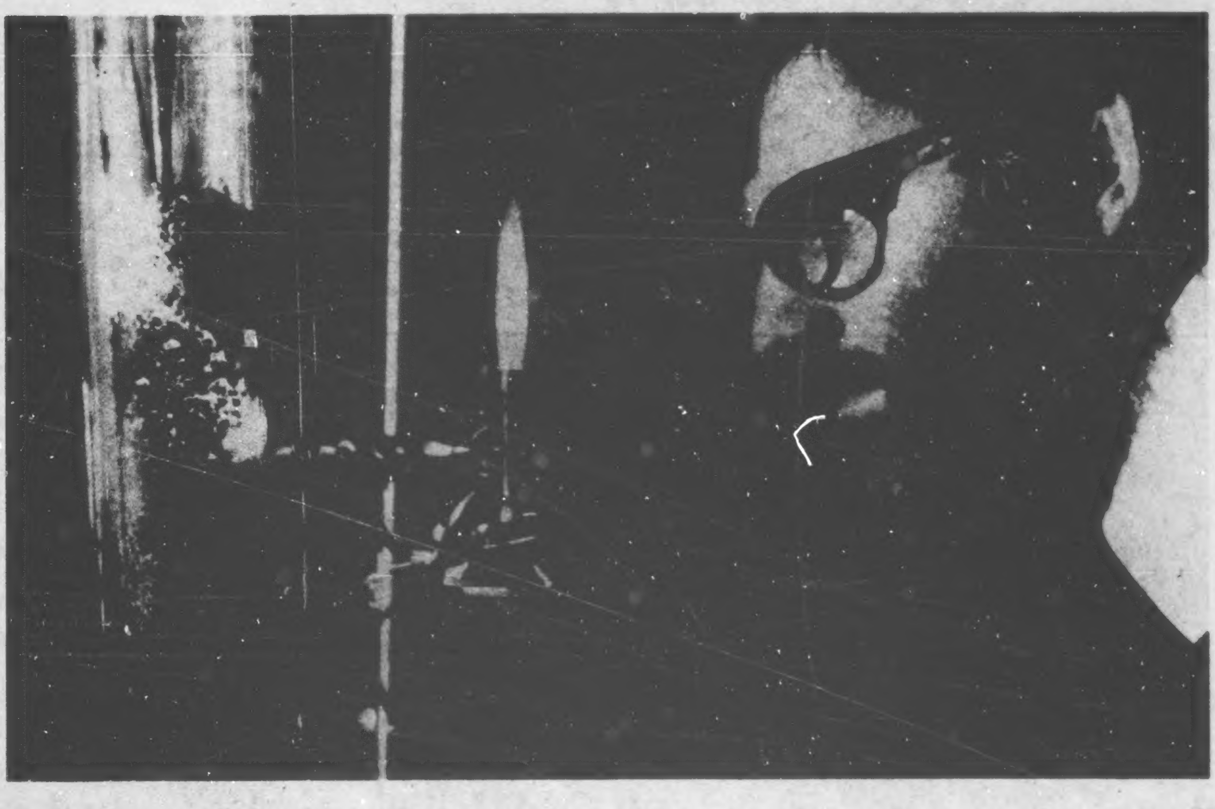
Technology Development

- Coal liquefaction processes, e.g., solvent-refined coal, donor solvent process and indirect liquefaction;
- Coal liquefaction residue treatment processes, e.g., gasification of residue tar;
- High-Btu and low-Btu coal gasification processes, hydrogasification and catalytic gasification; and
- Industrial coal gasifiers.

Research

Liquefaction

- Extraction
  - — Hydroextraction/desulfurization process research;
- Catalytic hydroliquefaction
  - — Exploratory evaluation of catalysts
  - — Investigation of slurry catalyst process;
- Pyrolysis and indirect liquefaction
  - — Flash hydrocracking/dilute phase hydrogenation
  - — Indirect liquefaction from synthesis gas;
- Refining and Chemicals
  - — Exploratory refining processes
  - — Refining of coal-derived synthetic crude oils; and
- Supporting Research
  - — Basic chemical and engineering studies, e.g., structure of coal, pre-asphaltenes, mechanism of coal hydroliquefaction, coal/solvent/hydrogen mixing studies, catalytic reactor modeling/design studies, preheater studies, role of mineral matter in coal liquefaction.



Gasification

- Advanced gasification processes for high-Btu gas
  - Catalytic gasification
  - Catalytic methanation
  - Rapid rate hydrogasification; and
- Advanced gasification processes for low- and intermediate-Btu gas and hydrogen
  - Short residence time (fast pyrolytic) gasification
  - Catalysts gasification for hydrogen; and
  - Preliminary engineering and economic assessments.

[redacted]

Program Information Contacts

Liquefaction—Fred Steffgen (412) 675-7000
(Pittsburgh Energy Technology Center)

Gasification— B. D. Prasher (304) 599-7346
(Morgantown Energy Technology Center)

Magnetohydrodynamics

Program Objectives

The objective of the Magnetohydrodynamics (MHD) program is to facilitate the commercialization of MHD electric power plants through the design, construction, and operation of a commercial prototype MHD power plant and Engineering Test Facility. This objective entails three specific goals for mature, coal-burning utility-sized MHD steam plants: (1) achieve overall coal-to-busbar energy conversion efficiencies in the 50 percent range; (2) meet all existing or proposed Federal standards for sulfur dioxide, nitrogen oxides, and particulate emissions with reduced thermal pollution; and (3) achieve a cost of electricity lower than potential alternative power systems.

Areas Covered by Current Projects

Technology Development

- Open-cycle MHD system components and subsystems testing.

Research

- Basic and engineering studies on the subsystems of MHD closed-cycle processes.

Program Information Contact

Marshall Sluyter (301) 353-5914

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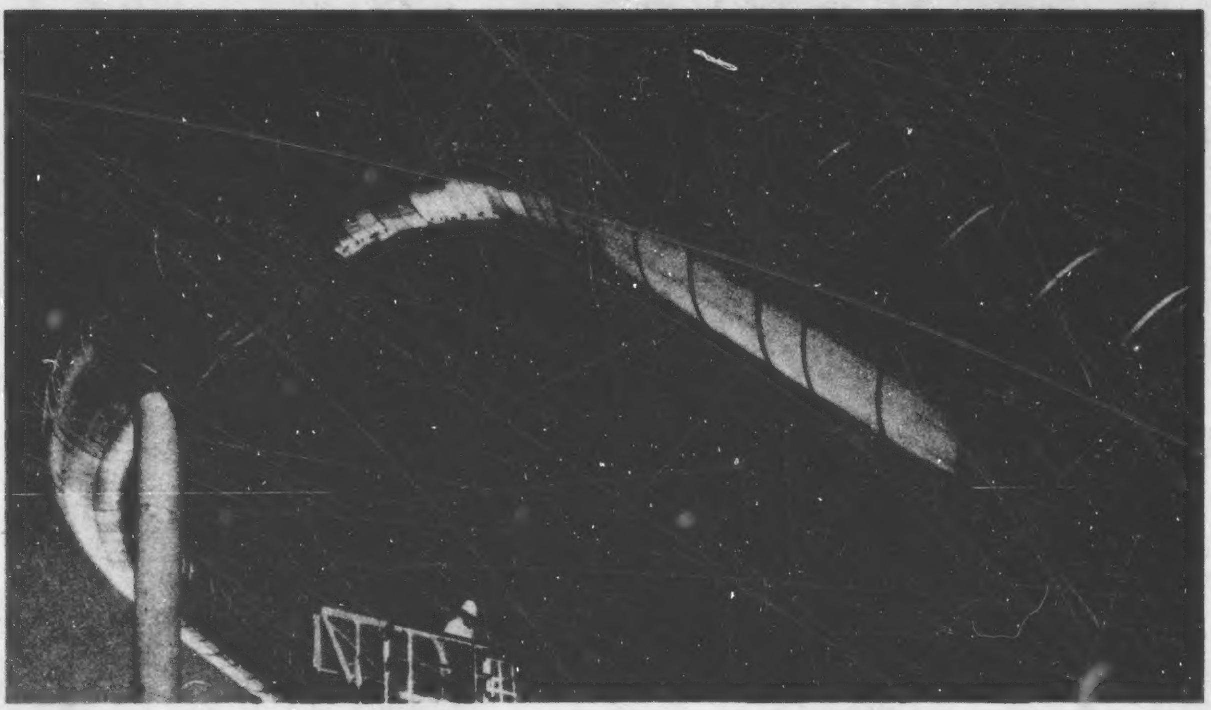


Mining

Program Objective

The main objective of the mining program is to develop the improved technologies required to supply solid fuels at acceptable economic and social costs. The activities under this program are aimed at improving systems technology; developing cost-effective equipment and techniques; developing and demonstrating new and innovative mining concepts; and developing economically competitive preparation technologies. These objectives will be met by exploring new systems for underground coal mining, surface coal mining, and coal preparation.

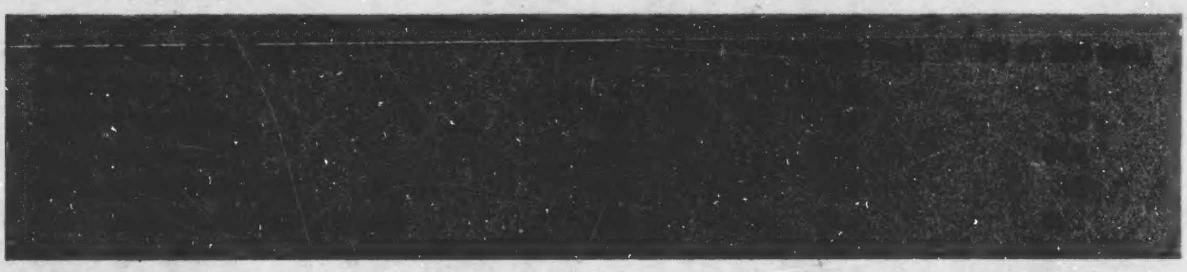
Areas Covered by Current Projects

Technology Development

- Underground coal mining—shaft development, in-mine development, production systems and logistics;
- Surface coal mining—area mining and contour mining; and
- Coal preparation—more efficient removal of pyritic sulfur and ash, retention of coal fines, dewatering and chemical removal of sulfur.

Research

- Mining systems;
- Mine logistics;
- Roof support and transport;
- Mining equipment;
- Coal properties;
- Coal preparation technology; and
- Environmental studies.



Program Information Contact

William B. Schmidt or Douglas Uthus, (301) 353-2737

Petroleum

Program Objective

The main objective of the Petroleum program is to encourage and support industry participation in demonstrating mature technologies to enhance the production rate and recovery of original oil-in-place, to encourage development and testing of more efficient processes, and to accelerate and implement offshore oil and gas drilling and production technology in U.S. Outer Continental Shelf areas. The program is supplemented by oil shale and tar sands activities to increase domestic oil and gas production from these resources.

Areas Covered by Current Projects

Technology Development

- Enhanced oil recovery—by micellar polymer flooding, carbon dioxide flooding, thermal processes, and advanced or novel concepts;
- Drilling technology—downhole telemetry, electrodrill, and deep drilling simulation;
- Offshore technology—sea floor instrumentation, data acquisition and analysis; and
- True and modified in situ retorting of oil shale.

Research

- Process and basic studies on enhanced oil recovery by using carbon dioxide flooding, micellar polymer flooding, thermal methods, microbiological processes, and other novel processes;
- Environmental studies related to enhanced oil recovery and drilling, and offshore technology;
- Product characterization and utilization of oil, gas, synthetic fuels, and unconventional energy sources;
- Characterization of oil product from shales and tar sands;
- Engineering and basic studies on oil recovery from shale and tar sands;
- Shale retorting by unconventional and novel processes; and
- Shale oil refining and utilization.

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Program Information Contacts

Herman Finke, Headquarters (301) 353-2734

Robert Folstein, (918) 336-2400
(Bartlesville Energy Technology Center)

Unconventional Gas

Program Objective

The main objective of the unconventional gas program is to augment domestic gas supply through unconventional geologic sources and in situ coal gasification. The current objectives of this program include: demonstration of field performance and acceptable predictive modeling capability for production of gas from lenticular tight formations, establishment of the necessary technology base to identify production potentials from low permeability gas formations, and development of commercially viable and environmentally acceptable underground coal gasification processes.

Areas Covered by Current Projects

Technology Development

- Enhanced gas recovery from existing gas wells;
- Gas recovery from eastern sandstone and Devonian shales;
- Gas recovery from western gas sands;
- Methane recovery from coal seams;
- Linked vertical well and modified technologies for in situ subbituminous coal gasification;
- Technology for in situ gasification of highly swelling bituminous coal; and
- Steeply dipping bed technology for in situ coal gasification.

Research

- Engineering and basic studies on gas recovery from Devonian shales;
- Basic studies on underground combustion; and
- Environmental studies related to in situ technology for coal gasification and for gas recovery from shales.

[redacted]

Program Information Contact

P. R. Wieber, (301) 353-2723

Advanced Research and Technology

Program Objective

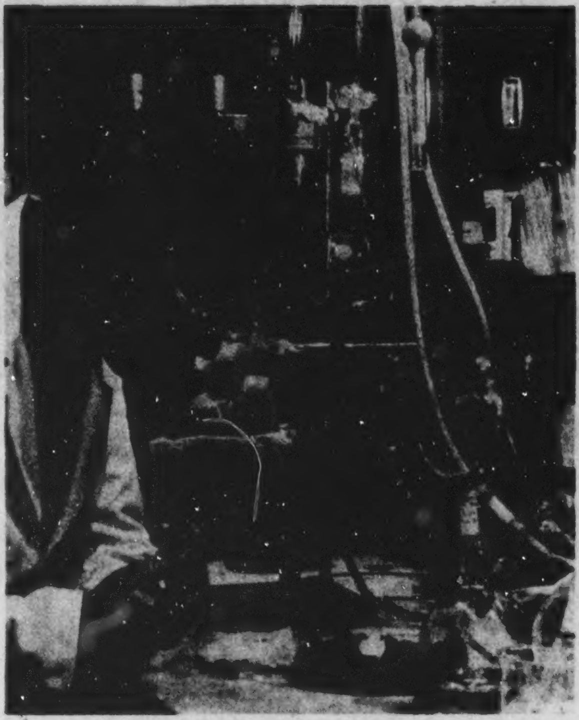
The objectives of the Advanced Research and Technology program are to assess and identify long-range advanced research needs in coal processing, fossil fuels utilization and extraction, materials, components, and instrumentation; to provide oversight of ongoing advanced research in fossil energy so as to ensure balance and proper priorities; to initiate and fund projects involving new, exploratory concepts or goal-oriented basic research; to manage the Materials Research and University Coal Research programs; and to provide policies for, and overview of, Fossil Energy-supported university activities. The Advanced Research and Technology program also is designed to provide an effective communications channel between the Fossil Energy program and academic institutions; to encourage these institutions to become involved in programs related to the DOE Fossil Energy mission; and to manage programs concerned with providing an adequate technical base for development of commercial construction materials and instrumentation for Fossil Energy pilot plants and demonstration plants.

The program supports workshops to identify research needs in all fossil energy technologies, and manages selected training programs for faculty and students at Energy Technology Centers.

Areas Covered by Current Projects

Research

- Materials evaluation;
- Materials research;
- Fluids and solids handling;
- Instrumentation and control;
- Component development;
- Technology transfer;
- Combustion of coal and synthetic fuels;
- Coal characterization and specificity related to liquefaction and gasification processes;
- The structure and reactions of coal and analysis of its conversion products;
- Multiphase flow phenomena related to coal conversion processes;
- Fundamental problems of reactor engineering; and
- Environmental aspects directly related to coal conversion processes and coal utilization.

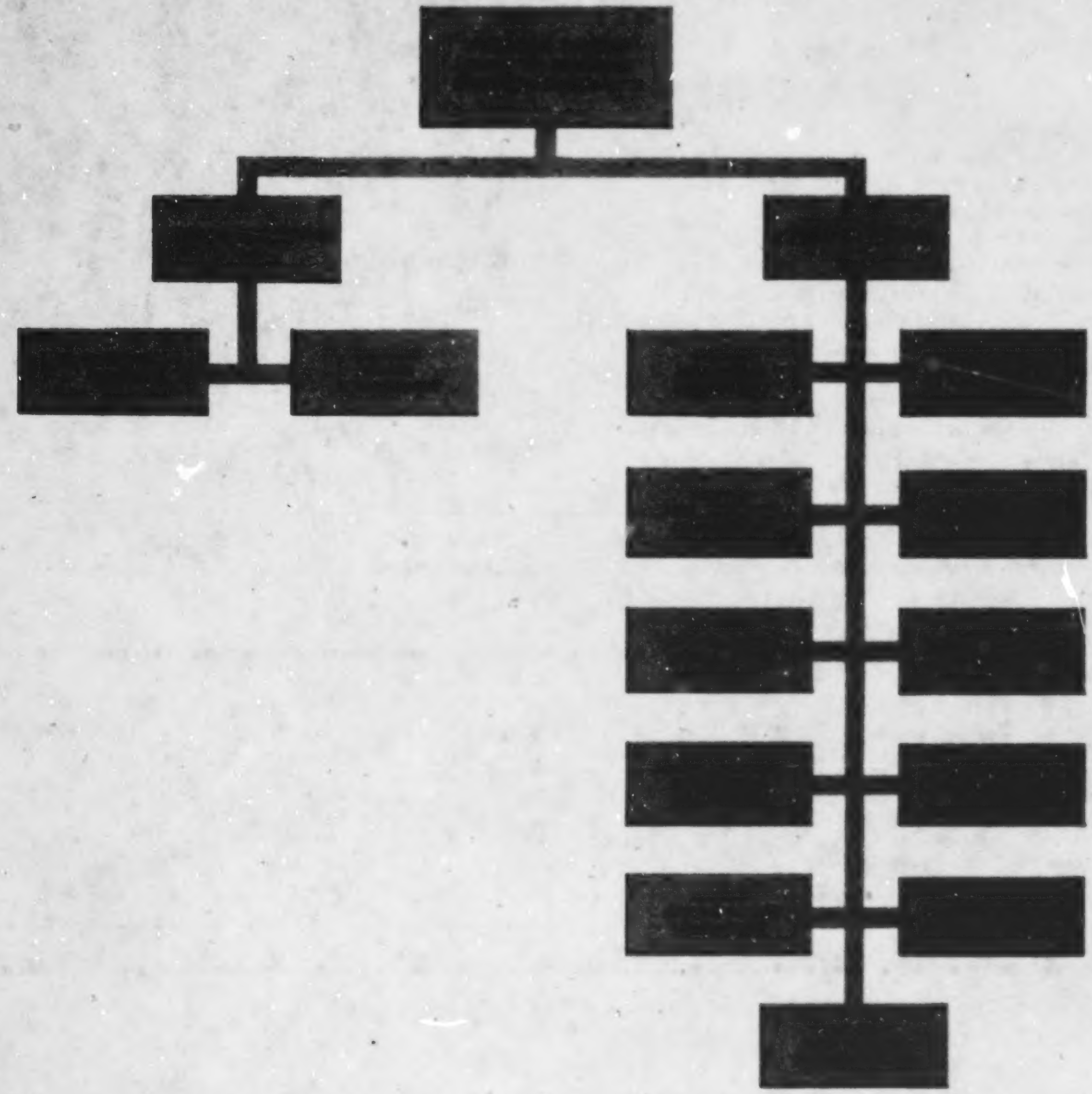


Program Information Contacts

Irving Wender, (301) 353-2784

Robert Wellek, (301) 353-2784

Nuclear Energy



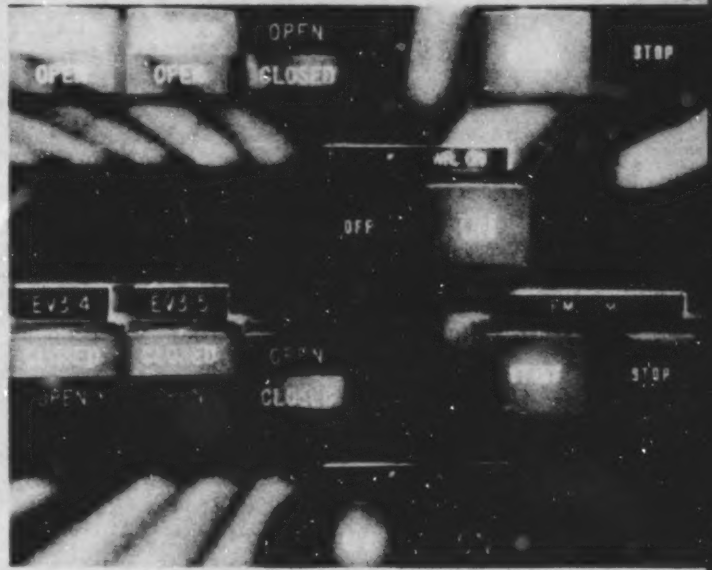
General Description

Within the Nuclear organization, the Office of Nuclear Energy is responsible for the administration of nuclear fission power generation and fuel technology, including breeder reactors; the evaluation of alternative reactor fuel cycle concepts, including nonproliferation considerations; development of space nuclear generator systems; and development of naval nuclear propulsion plants and reactor cores. The Office of Nuclear Waste Management provides direction for the planning, development and execution of DOE programs for civilian and defense nuclear waste processing and isolation, spent fuel storage and transfer, transportation of nuclear waste materials, and decommissioning and decontamination of DOE nuclear facilities.

Much of the Nuclear Energy effort is directed toward technology and engineering development programs, which do not involve research as performed in universities. Several programs of interest are discussed on the following pages.

Field Elements

The Assistant Secretary for Nuclear Energy has administrative responsibility for extensive field facilities listed above. The related multiprogram laboratories are described on pages 80 through 83. The Bettis and Knolls Atomic Power Laboratories conduct research and development of naval nuclear propulsion plants and reactors and operate prototype naval reactor plants. They are operated by Westinghouse and General Electric and are administered respectively by the Pittsburgh and Schenectady Naval Reactors Offices. The Clinch River Breeder Reactor and Fast Flux Test Facility Project Offices manage the breeder reactor plant project at Oak Ridge, Tennessee, and the Fast Flux Test Facility Project at Richland, Washington, respectively.



Liquid Metal Fast Breeder Reactor Program

Objective

The major objective of this program is to maintain and improve technical and engineering bases for selection of a breeder system consistent with anticipated national electric energy requirements and U.S. nonproliferation objectives.

Potential Areas for New Research Initiatives

- Methodology, systems and hardware to:
  - — Improve plant reliability
  - — Reduce plant capital costs
  - — Improve fuel performance and breeding
  - — Ensure plant safety.

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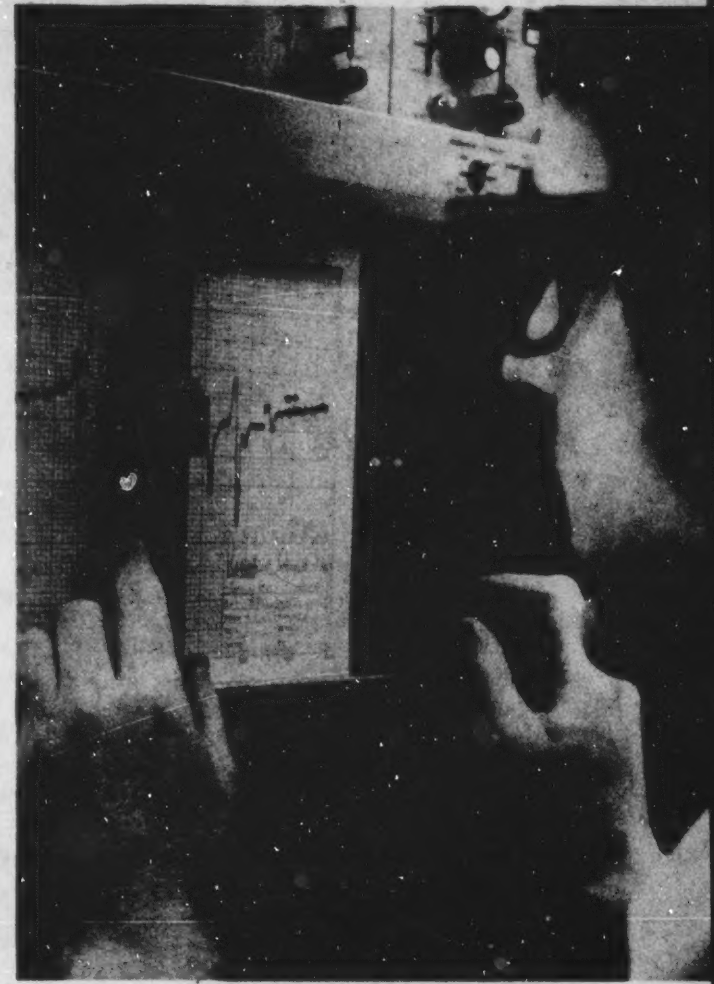
Program Information Contact

John J. McClure, (301) 353-5460

Advanced Isotope Separation and Advanced Nuclear Systems Programs



Objective

The objective of the Advanced Isotope Separation Program is to maintain U.S. leadership in this area. Three processes are under development for applying advanced isotope technology. They are the molecular laser process, the atomic vapor laser process, and the plasma separation process, with the potential collectively to reduce the cost of uranium enrichment by 50 percent compared to current technologies.

The purpose of the Advanced Nuclear System program is to translate into actual technology those concepts that can be clearly identified as furthering U.S. nonproliferation objectives. Within this category, two types of activities have been identified to date. These are the development and demonstration of technology for reducing the cost of enrichment of nuclear fuels and the evaluation of nonproliferation criteria related to specific designs of fuels cycle facilities.

Potential Areas for New Research Initiatives

- Advanced concepts in isotope separation;
- Laser photochemistry;
- Research on laser systems;
- Uranium materials science;
- Liquid phase photochemistry; and
- Research on medium-density low-temperature magnetized plasmas.

Advanced Isotope Separation

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Advanced Nuclear Systems

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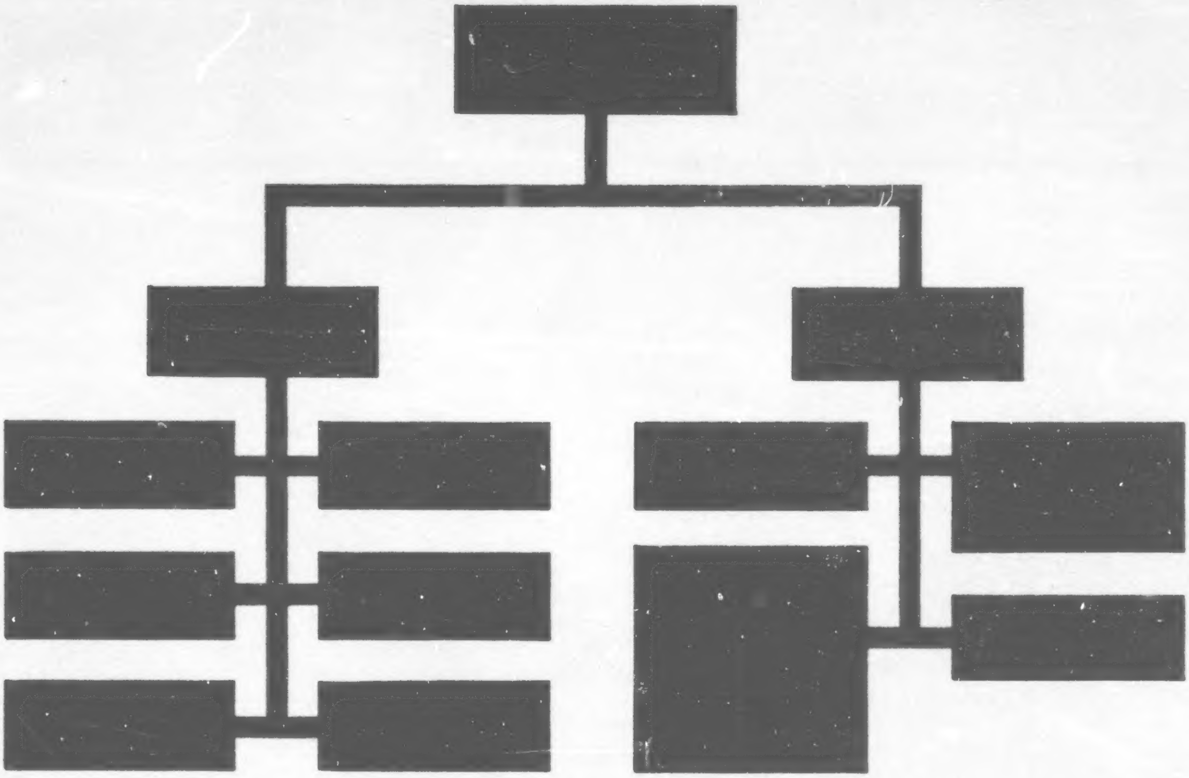
Program Information Contact

John J. McClure, (301) 353-5460

Defense Programs



General Description

The Assistant Secretary for Defense Programs manages Department of Energy programs for nuclear weapons research, development, testing, production, and surveillance; laser, heavy ion, and electron beam fusion; safeguards and security programs; international security program; and classification. In addition, he is responsible for the nuclear materials production program and exercises overview responsibility for the DOE weapons complex.

There are six major program offices within Defense Programs. They are the Offices of Military Application, Laser Fusion, Safeguards and Security, International Security Affairs, Nuclear Materials Production, and Classification. One of these programs, which has opportunities for university and other external research organizations, is discussed on the following pages.

Field Elements

In addition to the major program offices, the Office of Policy Analysis and Operations serves as the DOE focal point on policy and institutional management of assigned field facilities. These facilities include the following: three operations offices, five laboratories, ten production plants and the Nevada Test Site. The Operations Offices play a significant role in the development, production or testing of nuclear weapons. Los Alamos, Lawrence Livermore, and Sandia Laboratories are involved to varying degrees in support of all facets of the weapons program; i.e., design, engineering, test production, and surveillance. The New Brunswick Laboratory supports the security and safeguards program; Savannah River Laboratory is specifically involved in production of nuclear materials. The Mound and Savannah River Weapons Facilities, Amarillo, Kansas City, Pinellas, Rocky Flats, and Y-12 Plants are engaged in the weapons production program. The Savannah River, Hanford, Ashtabula, Fernald and Idaho Chemical Processing Plants provide a major part of the DOE Nuclear Materials Production Program. The Nevada Test Site is reserved for nuclear test operations.

General Program Information Contact

John E. Hennessey, Institutional Liaison and Communication Directorate, (301) 353-3260

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Safeguards and Security

Program Objectives

The Office of Safeguards and Security is responsible for coordination of DOE safeguards and security efforts to protect special nuclear materials, all classified activities, and DOE facilities. The Office develops, tests, evaluates and implements safeguards systems that incorporate physical protection, material control and material accountability into facility-wide integrated safeguards systems for each installation. The New Brunswick Laboratory supports this office through research on the security and safeguards of nuclear materials.

Problem Areas Requiring Additional Research

- Threat and risk assessment; and
- Contingency planning, crisis management exercises and information systems for incident management.

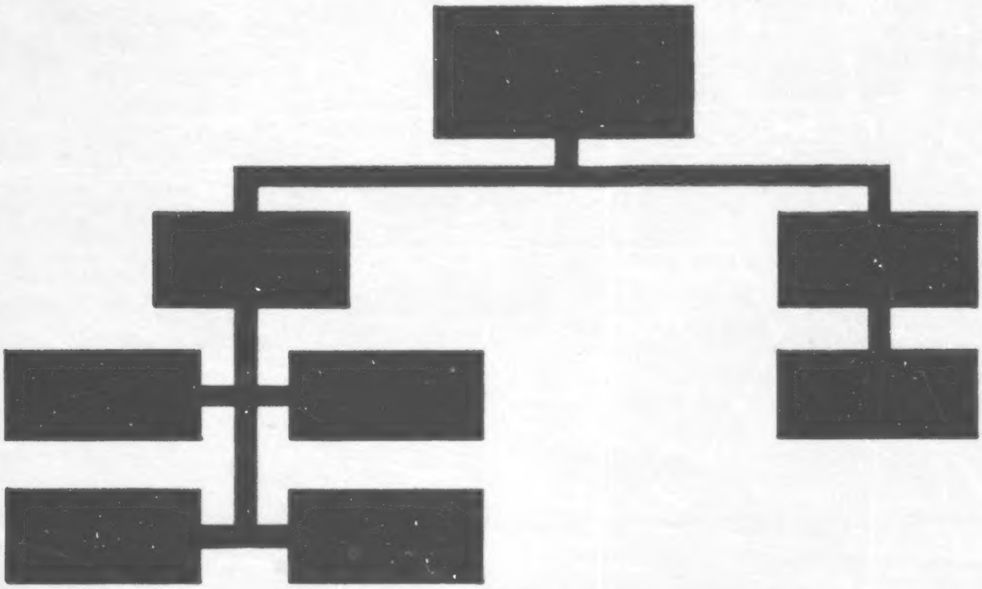
Potential Areas for New Research Initiatives

- Component and system development and implementation for effective safeguards and physical security; and
- Security of facilities and operations.

Program Information Contact

Joe Tinney, Office of Safeguards and Security, (301) 353-2910

Office of Consumer Affairs



General Description

The Office of Consumer Affairs acts as the focal point for the Department on consumer interests. In addition to providing services to other DOE offices, including top management offices, regarding the impact of DOE operations on all citizens, other major programs are aimed to ensure that Americans have the skills and knowledge to deal with energy as citizens, as consumers, and in their careers; to involve citizens in DOE policymaking and program development activities; and to assist special consumer groups, such as the elderly, handicapped and low-income, deal with energy problems, particularly through local organizations.

The Office is organized into three general divisions: Citizen Participation, Consumer Impact, and Education. The Education Program is discussed below.

References

1. Educational Activities of the Department of Energy, DOE/IR-0038.
2. Comprehensive Program and Plan for Federal Energy Education, Extension, and Information Activities, January 1980.

Education

Program Objective

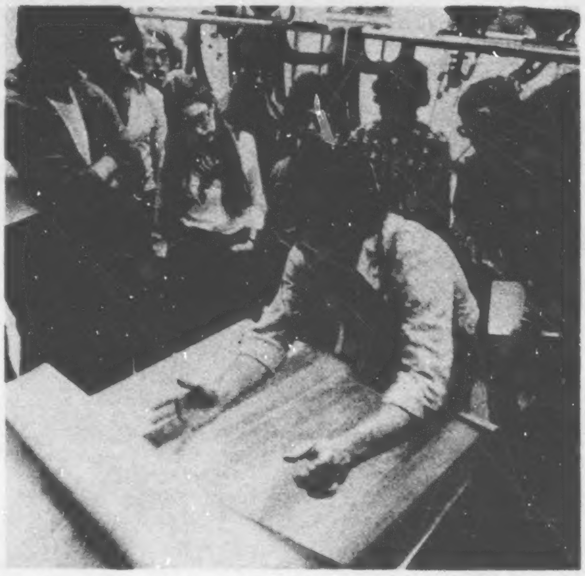
The primary objective of this program is to ensure that Americans have the knowledge and skills required to deal effectively with energy issues as citizens, as consumers, and in their careers. The program concentrates on the development of educational mechanisms, whether in schools or non-traditional environments, which provide accurate, objective, and broad energy learning opportunities. As a general strategy, the program focuses on individuals such as school teachers, public officials, and leaders in community groups.

Current activities include:

- Training teachers at all levels, at colleges and universities selected by DOE;
- Preparation, under contract (sometimes to col-

leges and universities) and dissemination (through the Technical Information Center at Oak Ridge, Tennessee) of course materials for classes in all fields and all levels to incorporate energy studies into the classroom;

- Assistance to colleges and universities in the recruitment and retention of women and minority candidates for undergraduate engineering programs;
- Special studies, sometimes performed by colleges or universities, on the effect of energy on educational activities in the United States, and on the impact of educational activities on energy issues;
- Assistance to non-school organizations with public memberships to provide substantive energy input to their training programs; and
- Cooperative projects with state and local agencies to incorporate energy topics into traditional educational settings.



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Program Information Contact

J. C. Kellett, Jr., Director, Education Programs, (202) 252-6480

Selected References

1. A Selected List of Department of Energy Publications for Energy Conservation for Schools.

2. Educational Activities in the Department of Energy, February 1980.

3. The Status of Energy Management Academic Programs in U.S. Institutions of Higher Education, September 1978.

4. Energy Related Activities in Two-Year Postsecondary Vocational Technical Institutions, November 1978.

Office of Minority Economic Impact

Program Objective

The Office of Minority Economic Impact was established in 1979 under the National Energy Conservation Policy Act (Public Law 95-916). Along with the DOE Energy Information Administration, the Office conducts an ongoing research program to determine the effects of national energy programs, policies and regulations of the Department upon minorities. The studies include the examination of socioeconomic and environmental effects.

Prior to May 1, 1980, this Office will be accepting replies from minority institutions to a Notice of Program Interest (OMEI-80-NPI-05) describing DOE requirements for energy-related minority economic impact research. The research will focus on the following objectives:

- Determining the average energy consumption and use patterns of minorities relative to other population categories;
- Evaluating the percentage of disposable income spent on energy by minorities relative to other population categories;
- Determining how programs, policies and actions of the Department of Energy and its components affect such consumption and use patterns and such income;
- Evaluating the socioeconomic impact upon minorities of significant shifts in energy availability and/or pricing; and
- Identifying and defining economic opportunities for minorities in energy research, production, conservation and development.

Within the specific objectives outlined above are the following generic goals:

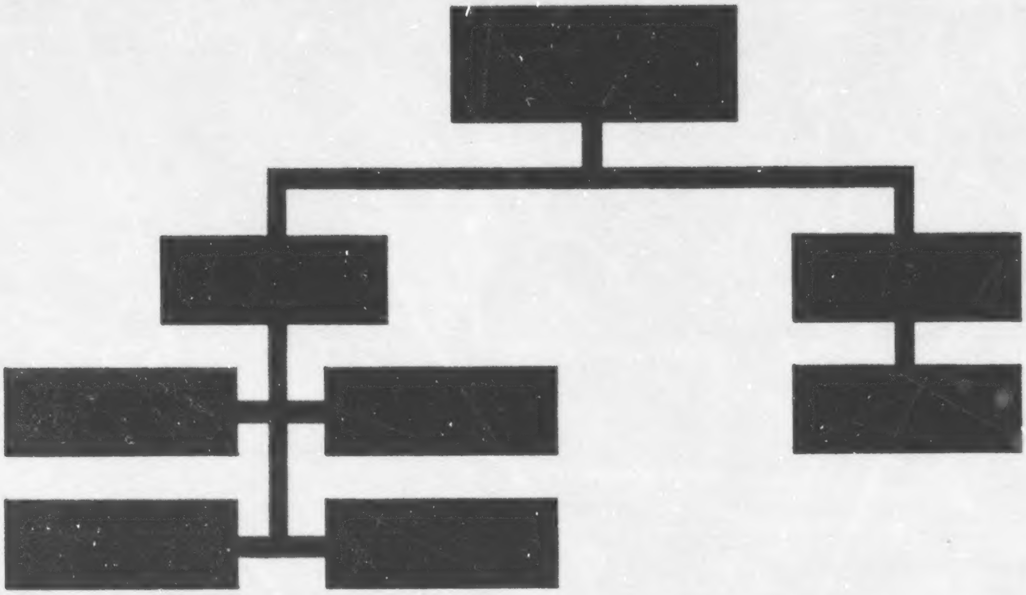
- To support research where the existing or potential capabilities of the applying institution can best be used to help the Department of Energy determine socioeconomic impacts of national energy programs and policies;
- To support faculty members in their development of skills in appropriate professional disciplines related to this area; and
- To support feasibility (or "proof of concept") research directed at defining socioeconomic energy impact problems for further and more detailed investigation.

[redacted]

Program Information Contact

Barry W. Haley, Office of Minority Economic Impact
U.S. Department of Energy
6A-211, Forrestal Building
Washington, D.C. 20585
(202) 252-8383

Policy and Evaluation



General Description

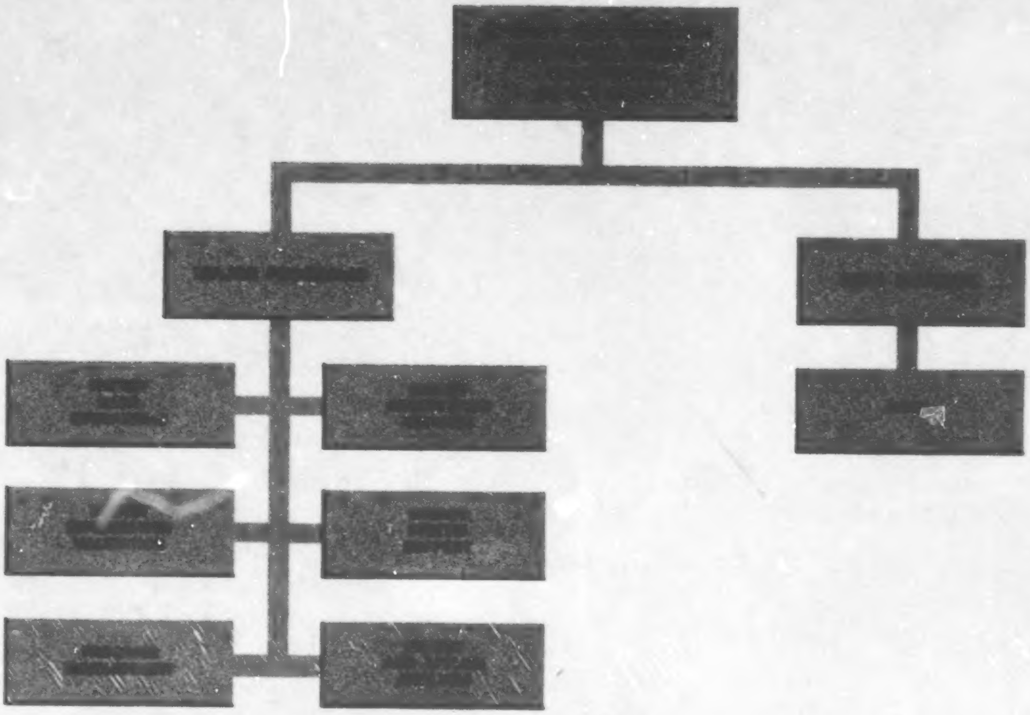
The Assistant Secretary for Policy and Evaluation assists the Secretary in developing and implementing national energy policy through analysis of critical energy issues and economic, regulatory, social and institutional factors influencing the establishment of Department policy coincident with the intent of the President and the Congress. He has primary responsibility for long-range planning, developing the analytical underpinning for national energy policy, and providing independent advice to the Secretary concerning the direction of DOE programs.

The Office of Policy and Evaluation is organized into four functional areas: Oil and Gas Policy; Coal, Nuclear and Electrical Systems; Conservation and Renewable Resources; and Systems Analysis. It has no administratively assigned field installations.

Program Information Contact

Walter S. Malinowski, Office of Policy and Evaluation, (202) 252-2431

Energy Information Administration



General Description

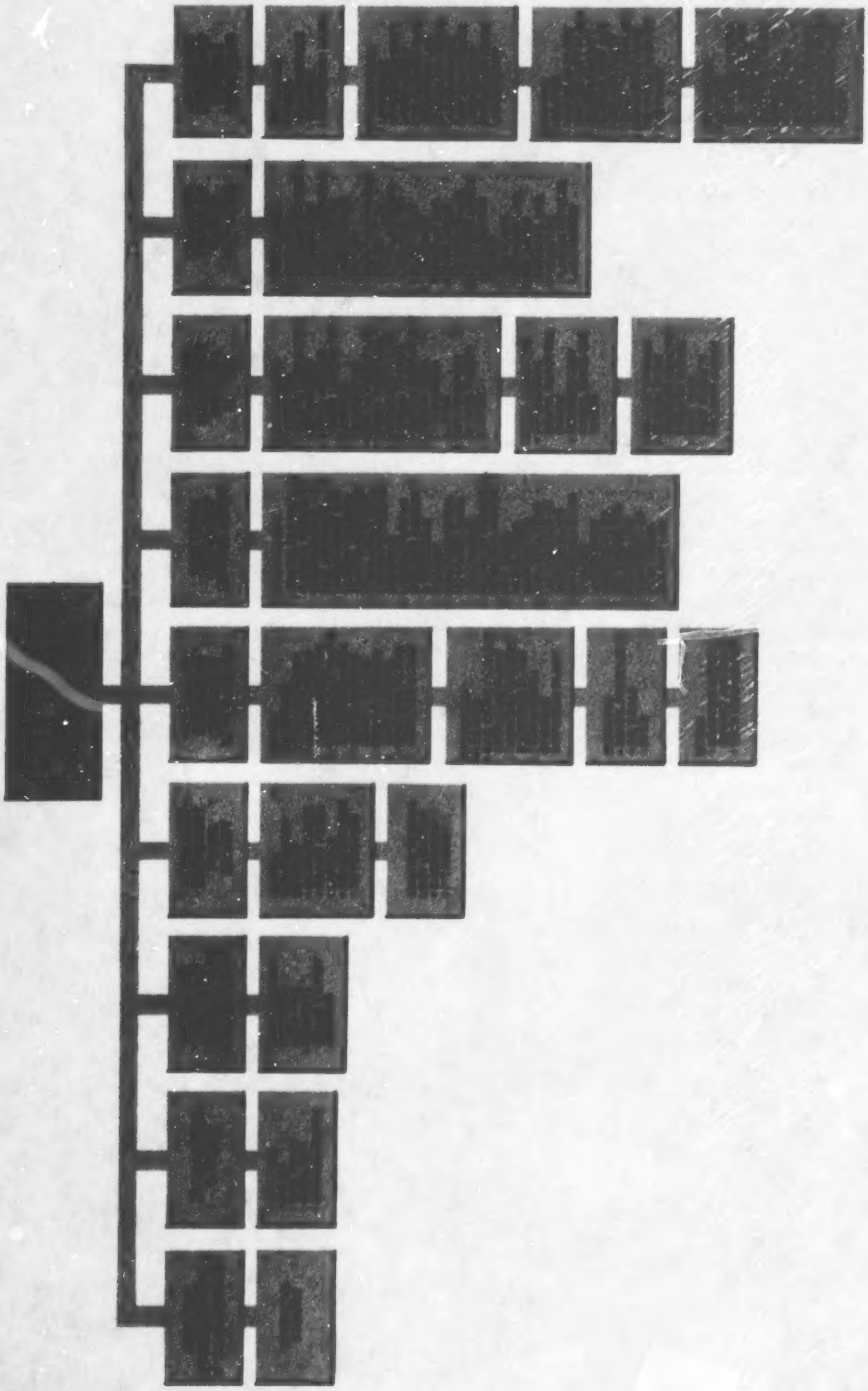
The Energy Information Administration is responsible for the development, collection, analysis, reporting, forecasting and dissemination of energy information. The organization has independent authority to collect and analyze information and determine the substance of statistical or forecasting technical reports. This Administration provides data and data-related services to all DOE components.

The Administration is divided into six major programs areas as shown above.

Program Information Contact

Robert Hull, Director, Financial Services Division, EIA, (202) 633-8[illegible]84

Field Organization



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Field Organization Functions

The various activities of DOE headquarters are supported through an extensive network of field organizations including regional offices and centers, national laboratories and other contractor-operated facilities and operations offices. The chart on the opposite page shows the organizational relationships between DOE field units and specific DOE headquarters program offices discussed in the preceding pages.

Regional representatives of the Secretary are located in each of the ten Federal regions (See pages 98 and 99). Staff members in these offices may also be contacted for general information about Department programs and functions. The Regional Offices are also responsible for the administration of certain delegated programs including the Small Scale Technology Program (page 44) and oversight of state energy conservation programs and plans.

Elements of the DOE field organization that are related to research and development are the field and project offices, multiprogram laboratories, and program-dedicated facilities. The field organization carries out important administrative, management, and execution functions and takes into account the diversity and geographic dispersion of the field programs, which include outreach; regulation; research; development; demonstration; production; maintenance of reserves; and defense research, development and testing.

Various units of the DOE field facilities have been given lead mission assignments with respect to DOE technical programs. As discussed on page 9 , it is DOE policy to decentralize implementation of selected DOE technical programs to DOE field facilities. Therefore, researchers seeking to explore research ideas in advance of submitting a proposal should determine whether the management functions of proposal evaluation and award decisions for the appropriate program area have been assigned to a field facility.

Most units of the DOE field facility network have established programs of cooperation and interaction with the university community. These programs include cooperative research, research participation, education and training.

The field and project offices consist of both civil service-staffed operations offices, which are more general in their scope of activities, and others dedicated to specific programs or projects. Responsibilities of these offices include project

management; contracting with industry, universities, state and local governments, and others as needed to plan and carry out DOE projects; negotiating, executing, and administering contracts to operate DOE contractor-operated facilities; and contractor appraisal. Several of the operations offices also provide contract support services to the program divisions at headquarters for research and development awards placed with university and industrial contractors within their region or assigned areas of responsibility.

The multiprogram laboratories are Government-owned and contractor-operated. In general, they support two or more programs. The Department's multiprogram national laboratories are a critical component in the overall technological approach to alleviating the Nation's energy problem. Their most important function is the solution of significant technological problems that require their unique capabilities and facilities. Their technology role will be pursued in concert with the complementary research-oriented skills of the universities and the applications-oriented skills of the private sector.

Field Capabilities

University research organizations are encouraged to discuss and develop possible joint research efforts with DOE field organization staffs. The DOE field units, in turn, have been encouraged to carry out collaborative efforts with universities and private industry in key program areas. To facilitate such interrelationships, each of the following brief field activity descriptions lists areas of research and identifies a point of contact who is knowledgeable about technical activities within his or her organization.

Because of the diversity of resources, activities and capabilities across the field and project offices and laboratories, the remainder of this section is devoted to discussing each facility in turn. For convenience in presentation, field and project offices are grouped together as are the laboratories. A list of addresses for field organizations discussed below is found on page 100.

Major DOE Field Offices

Operations Offices

Albuquerque Operations Office, Albuquerque, New Mexico
Herman Roser, Manager, Telephone (505) 844-7231

The Albuquerque Operations Office is principally concerned with the management of the nuclear weapons research, development and production complex. This includes basic physical and biomedical research, nuclear safety programs, thermonuclear conversion of energy for power applications, nuclear and nonnuclear energy development, and the detection of nuclear explosions.

Chicago Operations and Regional Office, Argonne, Illinois
Robert Bauer, Manager and Regional Representative, Telephone (313) 972-2110

The Chicago Operations and Regional Office is responsible for the administration of research and development projects and associated engineering and construction including the development of energy sources, particularly in advanced nuclear reactor systems; fossil, solar, geothermal and other energy alternatives; and basic and applied research programs in the biological, medical and physical sciences. Chicago Operations Office staff members also administer contracts for the operation of major Government-owned laboratories, and contracts and grants with educational institutions and industrial concerns. This office is the DOE contact point for the majority of university basic agreements (see list on page 103).

Idaho Operations Office, Idaho Falls, Idaho
Charles Williams, Manager, Telephone (208) 526-1322

The Idaho Operations Office administers the DOE Idaho National Engineering Laboratory. Currently, Idaho Operations Office has major developmental assignments in geothermal energy, low-head hydroelectric applications, and a new concept (magnetohydrodynamic) coal-fired power plant. Other programs include reactor safety testing, reactor fuels and materials testing, reprocessing of Government-owned nuclear fuels, and radioactive waste management. Most of the work is conducted in Government-owned contractor-operated facilities but some is performed under grants or contracts with industry, and state or local governments. The office also directs an engineering and construction program, the Radiological and Environmental Sciences Laboratory, and the National Environmental Research Park.

Nevada Operations Office, Las Vegas, Nevada
Mahlon Gates, Manager, Telephone (702) 734-3211

The Nevada Operations Office is concerned with the management and support of nuclear detonation programs for weapons development, detection of nuclear explosions, peaceful application of nuclear explosives, and conducting research and development projects on energy recovery techniques independent of nuclear explosives. It plans and programs nuclear test events at the Nevada Test Site and elsewhere and provides support services to DOE weapons laboratories and Department of Defense agencies at the test locations. Included are the maintenance and operation of test sites and the design and construction of test facilities, including extensive drilling and mining activities.

Oak Ridge Operations Office, Oak Ridge, Tennessee
Robert Hart, Manager, Telephone (615) 576-4444

The Oak Ridge Operations Office is responsible for wide-ranging programs in production, research, education and training. The principal function of the Oak Ridge Operations Office is management of the processing of uranium concentrates and other source and raw materials into feed materials, and the further processing of uranium feed materials into uranium 235. This is accomplished at DOE gaseous diffusion plants located at Oak Ridge, Tennessee; Paducah, Kentucky; and Portsmouth, Ohio. The Oak Ridge Operations Office also manages research, development and production at Government-owned, contractor-operated facilities. These management efforts relate to weapons component production, reactor development and technology, fusion research, breeder reactor research and demonstration, biological research, health physics, environmental studies, and nuclear and nonnuclear education and training programs.

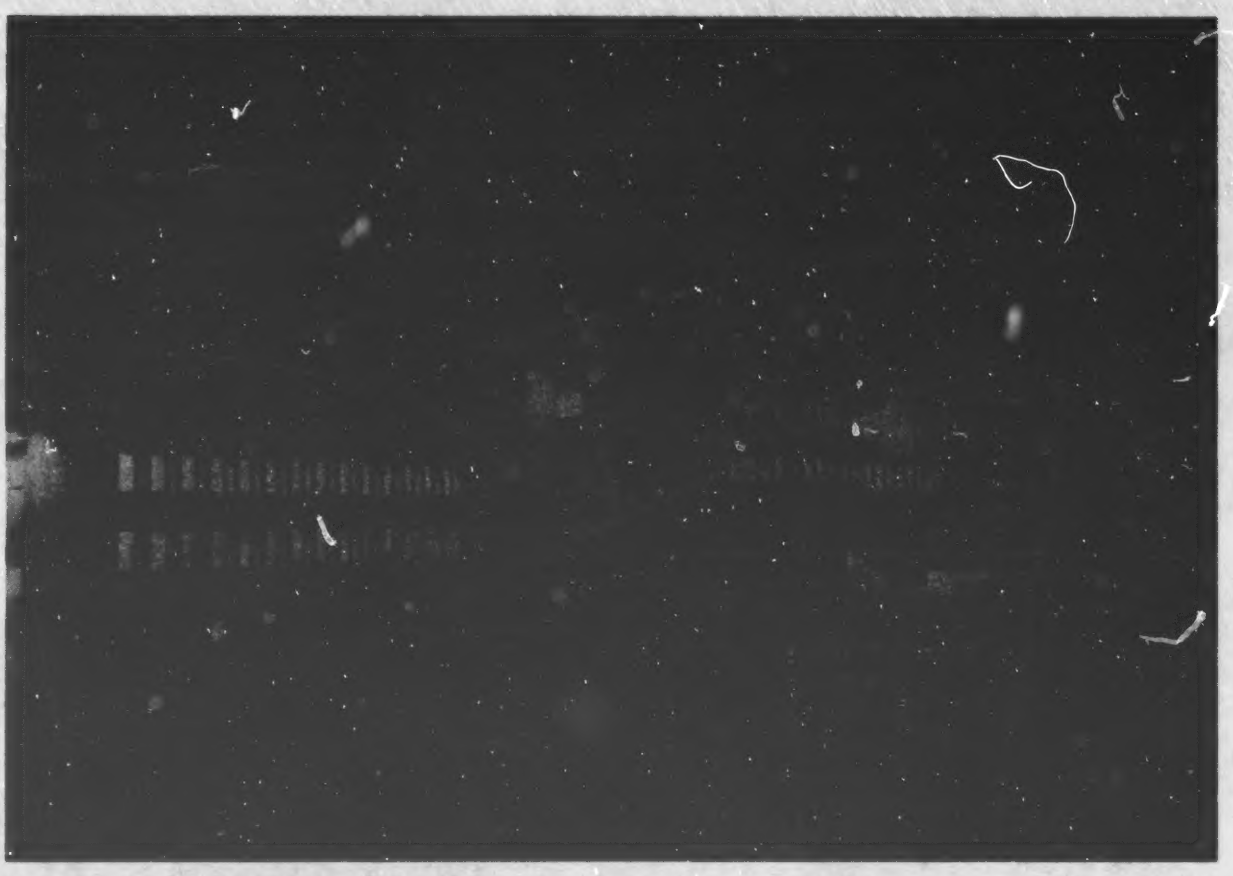
Richland Operations Office, Richland, Washington
Alex Fremling, Manager, Telephone (509) 942-7395

The Richland Operations Office is concerned with the processing of uranium feed materials into special nuclear material, and with research in reactor development, reactor fuels, chemical processing, radioactive waste management, and biology and medicine. Facilities include nuclear reactors, chemical processing plants and various laboratories.

San Francisco Operations Office, Oakland, California
Joseph La Grone, Manager, Telephone (415) 273-7111

The San Francisco Operations Office is involved with research and development activities in the physical sciences; biology and medicine; and solar, geothermal and other alternative energy sources. The Office's principal contractor is the University of California, which operates laboratories at Livermore and Berkeley, California.

Savannah River Operations Office, Aiken, South Carolina
R. L. Morgan, Manager,
Telephone (803) 725-2277



The Savannah River Operations Office is primarily concerned with the operations of the Savannah River Plant for production of special nuclear material. Plant operations consist of fuel element fabrication, nuclear reactors, fuel reprocessing facilities, and heavy water production facilities. In addition, it manages the Savannah River Laboratory, which conducts research and development activities in support of plant operations and DOE programs. E.I. DuPont de Nemours & Co., Inc., is responsible for the design, construction and operation of the plant facilities.

Field Office

Grand Junction Office, Grand Junction, Colorado
D.L. Everhart, Manager, Telephone (303) 242-8621

This office is concerned with estimating national resources of uranium; providing data needed by DOE, other Government agencies and the nuclear industry in planning for national energy requirements; evaluating uranium resources in the United States; developing resource estimates for industry use in exploration for additional uranium to satisfy requirements for nuclear power; developing improved uranium exploration, assessment, and production technology; administering leases of mineral lands under DOE control; and carrying out activities relating to environmental effects of uranium mining and milling operations and corrective programs. (Proposals for work in these areas should be submitted directly to the Grand Junction Office).

Energy Technology Centers

The five Energy Technology Centers and the two Mining Technology Centers report to the Assistant Secretary for Fossil Energy. Each is discussed below.

Bartlesville Energy Technology Center, Bartlesville, Oklahoma
Harry Johnson, Director, Telephone (918) 336-2400

The Bartlesville Energy Technology Center has a major research mission in the production and utilization of petroleum, natural gas and other types of energy. The Center has responsibility for monitoring large-scale contracts in projects designed to enhance the recovery of crude oil and natural gas and is the lead technical organization for internal combustion energy research.

Carbondale Mining Technology Center, Carbondale, Illinois
A.C. Van Besien, Director, Telephone (618) 985-3771

The Carbondale Mining Technology Center is a federally-owned and operated research facility involved with development of better methods for solid fossil fuel extraction. It is affiliated with Southern Illinois University, thereby providing close contact with the academic community. The Center is responsible for implementing and monitoring $20 million of the extraction program funded to outside industry.

Grand Forks Energy Technology Center, Grand Forks, North Dakota
Gordon Gronhovd, Director, Telephone (701) 795-8131

The Grand Forks Energy Technology Center has the applications center responsibility for investigations that will aid extraction, processing, and utilization of low rank coal, including lignite, so that its value to the economy can be realized under conditions compatible with the natural environment. The Center houses administrative offices and small-scale laboratories plus a pilot plant for investigations.

Laramie Energy Technology Center, Laramie, Wyoming
Andrew Decora, Director, Telephone (307) 721-2212

The Laramie Energy Technology Center is concerned with research and development directed toward the production and utilization of supplemental sources of energy in an environmentally acceptable manner. Major areas involve oil shale research, the recovery of bitumen from tar sand deposits, and in situ coal gasification research.

The work is performed both at Laramie and at various field locations in Wyoming, Utah and Colorado.

Morgantown Energy Technology Center, Morgantown, West Virginia
Augustine Pitrolo, Director, Telephone (304) 599-7511

The Morgantown Energy Technology Center is directed chiefly toward new and improved technology to provide clean energy and fossil fuels with minimum waste production and pollution. It is the lead DOE agency for unconventional gas recovery, fluidized bed combustion, gas stream cleanup, flue gas desulfurization, combined cycle component integration, surface coal gasification, and component development for coal conversion and utilization processes. Nuclear meters are being developed to determine rapidly the moisture and sulfur content of coal in preparation plants, thus minimizing coal loss to refuse, thereby producing a cleaner product.

Pittsburgh Energy Technology Center, Pittsburgh, Pennsylvania
Sun Chun, Director, Telephone (412) 675-6400

The Pittsburgh Energy Technology Center conducts research on new coal uses that will extend national alternate energy sources. It is the lead DOE organization for coal liquefaction, synthetic fuels characterization, coal-oil mixtures, combustion phenomena and magnetohydrodynamic combustion.

Pittsburgh Mining Technology Center, Pittsburgh, Pennsylvania
E.R. Palowitch, Director, Telephone (412) 675-6400

The Pittsburgh Mining Technology Center is a federally-owned technology development center that is located close to the DOE Pittsburgh Energy Technology Center, the Department of Labor Mine Health and Safety Administration, and the Bureau of Mines Pittsburgh Mining and Safety Research Center. It is concerned with underground coal mining technologies and research required to more efficiently mine and prepare the coal needed to meet the Nation's current and projected demand.

Multiprogram Laboratories

The 12 multiprogram laboratories represent the core of the integral DOE scientific and technological base. Of the 12 laboratories, nine are unrestricted in their availability to serve all DOE programs (Ames, Argonne, Brookhaven, Hanford, Idaho, Lawrence Berkeley, Oak Ridge, Pacific Northwest and Savannah River) and three are limited in their availability and referred to as weapons laboratories (Lawrence Livermore, Los Alamos and Sandia). Each of these laboratories is discussed briefly in the following paragraphs.

Ames Laboratory, Ames, Iowa
Robert S. Hansen, Director, Telephone (515) 294-2770

Ames Laboratory is operated for DOE by Iowa State University under the administrative

management of the Chicago Operations and Regional Office. Its staff of 450 conducts research principally in materials sciences centering on the preparation, purification, chemical characterization and structure identification of new materials, followed by evaluation and interpretation of their chemical, physical and mechanical properties. Other programs include chemical analyses, pollutant identification, solar demonstration, and nuclear isotope and heavy ion studies.

Argonne National Laboratory, Argonne, Illinois and Idaho Falls, Idaho
Walter E. Massey, Director, Telephone (312) 972-5555

Argonne National Laboratory is operated for DOE by the University of Chicago and the Argonne Universities Association, under the administrative management of the Chicago Operations and Regional Office. Its staff of over 5,000 is principally involved in reactor development, with other programs in basic energy sciences, energy and environmental technology, high energy physics, and biomedical and environmental research.

Brookhaven National Laboratory, Upton, Long Island, New York
George H. Vineyard, Director, Telephone (516) 345-3335

Brookhaven National Laboratory is operated for DOE by Associated Universities, Inc., under the administrative management of the Chicago Operations and Regional Office. Its staff of over 3,000 is involved in high energy physics and research in basic energy sciences. About 60% of Brookhaven effort is devoted to advanced energy systems, with lesser activity in environmental research, conservation and other programs. The National Synchrotron Light Source Accelerator (ISABELLE) is currently under construction at Brookhaven.

Hanford Engineering Development Laboratory, Richland, Washington
John B. Yasinsky, Director, Telephone (509) 942-3915

Hanford Engineering Development Laboratory is operated for DOE by the Westinghouse Hanford Company, under the administrative management of the Fast Flux Test Facility Project Office and the Richland Operations Office. Its staff numbers approximately 3,000. Principal program activity is concentrated on breeder reactor technology with smaller efforts in fuel cycle research and development, magnetic fusion development and technology, and nuclear research and applications.

Idaho National Engineering Laboratory, Idaho Falls, Idaho

Charles E. Williams, Director, Telephone (208) 526-1322

Idaho National Engineering Laboratory is operated for DOE by EG&G Idaho, Inc., and Exxon Nuclear Idaho Co., Inc., under the administrative management of the Idaho Operations Office. Its staff consists of 2,200 members. Present assignments for this laboratory include reactor safety, materials and fuels processing, waste management, liquid metal-cooled fast breeder reactor and geothermal energy research and development, naval propulsion reactors testing, and radiological and environmental research.

Lawrence Berkeley Laboratory, Berkeley, California

Andrew M. Sessler, Director, Telephone (415) 486-5111

Lawrence Berkeley Laboratory is operated for DOE by the University of California under the administrative management of the San Francisco Operations Office. Its staff of 3,400 is principally involved in fundamental research in high-energy and nuclear physics and in the basic energy sciences. Other research is conducted on the fundamental biological processes in plants and animals, and in energy conservation. The Laboratory operates several accelerators and directs the National Resource for Computation in Chemistry.

Lawrence Livermore National Laboratory, Livermore, California

Roger E. Batzel, Director, Telephone (415) 422-7401

The Lawrence Livermore National Laboratory is operated for DOE by the University of California under the administrative management of the San Francisco Operations Office. The Livermore staff numbers 7,000. Nuclear weapons design accounts for approximately half the laboratory's effort and continues to be its primary responsibility. The program addresses current weapons requirements of the Department of Defense, exploration of new nuclear explosive concepts, a broad range of

LAWRENCE LIVERMORE LABORATORY
SOUTH ENTRANCE

research and development, and the conduct of nuclear tests essential for exploration and design of nuclear explosives. Other Livermore Laboratory programs include laser fusion technology development, laser isotope separation methods, and biomedical and environmental studies.

Los Alamos National Scientific Laboratory, Los Alamos, New Mexico
Donald M. Kerr, Director, Telephone (505) 667-5101

The Los Alamos National Scientific Laboratory is operated for DOE by the University of California under the administrative management of the Albuquerque Operations Office. In the field of weapons, which constitutes about half the activities at Los Alamos, the laboratory is responsible for the development of nuclear warheads. Nonweapons work is concentrated on advanced nuclear reactor designs, the physics of controlled thermonuclear reactions, nuclear science research, and environment and safety. The Laboratory also operates an 800 MeV proton accelerator.

Oak Ridge National Laboratory, Oak Ridge, Tennessee
Herman Postma, Director, Telephone (615) 576-2900

The Oak Ridge National Laboratory is operated for DOE by the Union Carbide Corporation, Nuclear Division, under the administrative management of the Oak Ridge Operations Office. The efforts of a staff of 5,000 are largely directed toward four areas roughly equal in size. fission energy development, biomedical and environmental research, basic energy sciences, and magnetic fusion. In addition, there are growing programs in fossil energy and conservation. Oak Ridge houses the fast breeder reactor program and is responsible for heavy ion research and superconducting magnet test facilities.

Pacific Northwest Laboratory, Richland, Washington
Douglas E. Olesen, Director, Telephone (509) 375-2201

Pacific Northwest Laboratory is operated for DOE by Battelle Memorial Institute under the administrative management of the Richland Operations Office. Its staff of 2,000 works on various programs, principally in nuclear fuel cycle research and development. Other programs include environmental research and development, solar energy, and research in basic energy sciences.

Sandia National Laboratories, Albuquerque, New Mexico and Livermore, California
Morgan Sparks, President, Telephone (505) 844-7261

The Sandia National Laboratories are operated for DOE by the Western Electric Company under the administrative management of the Albuquerque Operations Office. Sandia's central mission is the development of the nonnuclear portions of nuclear weapons. This program involves about three-fourths of a 7,500-person total effort. Sandia is also responsible for major programs in fossil, solar and laser fusion. In addition, the Nuclear Regulatory Commission sponsors major projects at Sandia in advanced reactor research and nuclear fuel cycle safety.

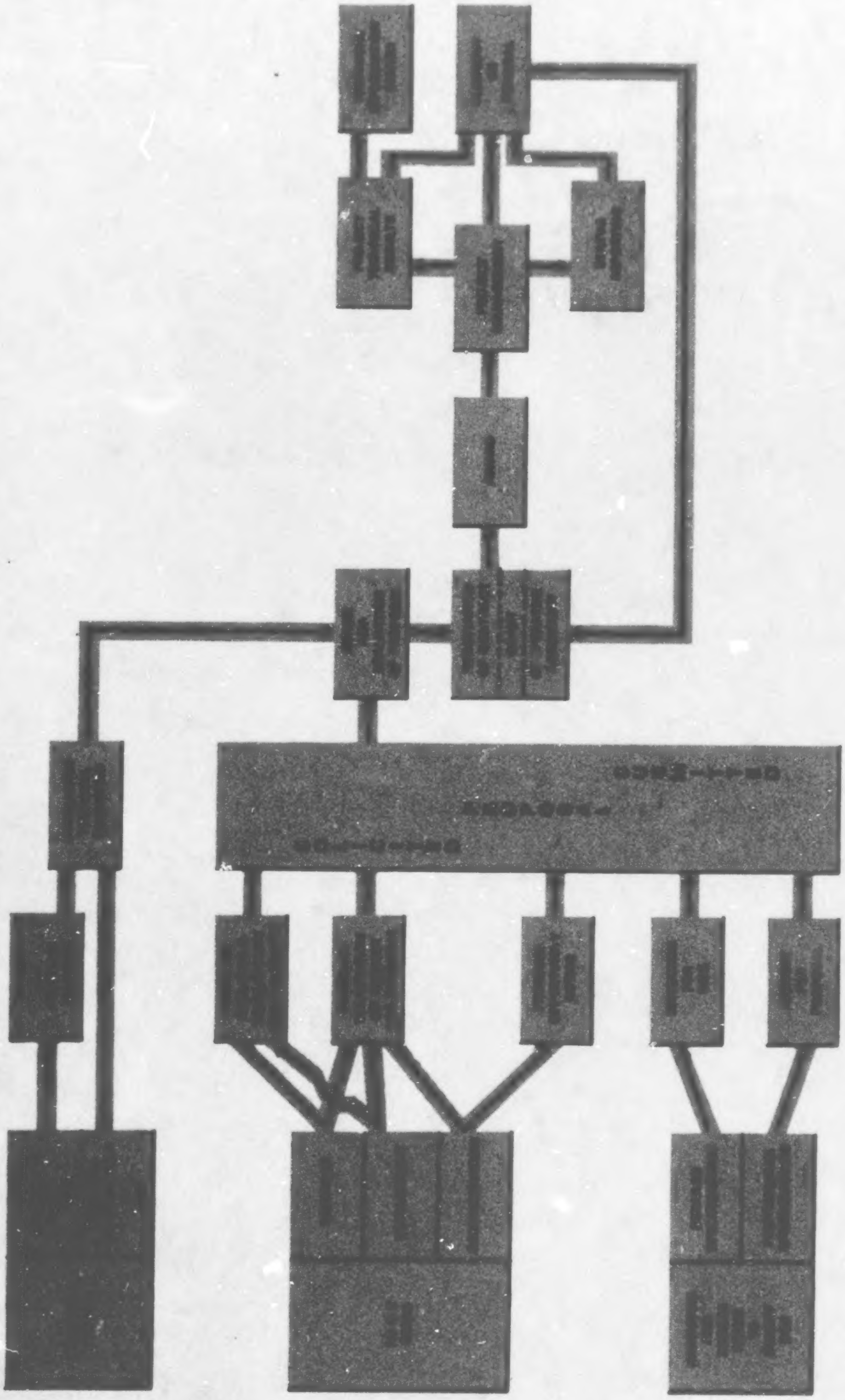
Savannah River Laboratory, Aiken, South Carolina
A.H. Peters, Director, Telephone (803) 725-6211

Savannah River Laboratory is operated for DOE by E.I. du Pont de Nemours and Company, under the administrative management of the Savannah River Operations Office. Its 1,000-person staff provides developmental and technical assistance in all phases of the nuclear fuel cycle: uranium resource evaluation, fuel fabrication, isotope production, reactor physics and engineering, fuel reprocessing, waste management, environmental monitoring, and heavy water production.

Part II.

DOE Procurement and Assistance Policies/Procedures

Proposal and Project Management Process



Part II.
DOE Procurement and Assistance Policies/Procedures

Introduction

The Chief Financial Officer is the business manager of DOE responsible for budget, financial operations, procurement, cost estimating and the development of business-related policy.

Of the offices reporting to the Chief Financial Officer, the Director of Procurement and Contracts Management (PR) is the principal official and business advisor on all procurement, contracting and other business arrangements for DOE. The Director of PR is responsible for establishing overall policy and regulations for the Department in the areas of procurement, financial assistance, and contract management; providing functional management and review of the field buying offices; managing the industry liaison, small business and disadvantaged business enterprise, women-owned business enterprise and labor surplus area programs; providing support in advance planning related to procurement and financial assistance programs; and managing the operation of the Source Evaluation Board process. The Director is also responsible for the Headquarters Procurement Operations Office, which is the largest buying office in DOE.

One division under Procurement and Contracts Management is the Business Liaison Division, which formulates and implements activities to establish and maintain a central point of contact for effective two-way communications with the private sector, particularly with groups representing various segments of the business and academic communities, for discussion of business matters related to contract policies, procedures and other procurement matters not identified with a specific contract problem.

Some of the responsibilities and activities of these offices are discussed on the following pages.

There are two principal means by which a researcher may obtain DOE funding or other support for research projects. Each of these begins with the presentation and submission of a proposal. A proposal submitted in response to a competitive solicitation issued by DOE is termed a solicited proposal, whereas a proposal prepared and submitted solely on the researcher's own initiative is an unsolicited proposal.

Information detailing the steps for preparing and submitting a solicited proposal will be found within the text of the solicitation. For unsolicited proposals, researchers who have original, unsolicited ideas that they believe would be of interest to one of the program entities identified in Part I, will find an overview of the steps necessary to obtain DOE support in Part II.

Sections of Part II describe generally the DOE solicitation process including solicitation characteristics, proposal requirements, proposal evaluation, types of award instruments, and DOE project management procedures. The chart on the opposite page outlines the overall proposal and project management process.

A glossary of terms may be found beginning on page 95.

It should be noted that the Federal Procurement Regulations and the DOE Procurement Regulations (Reference 6, page 97) generally govern all procurement relationships with DOE, and the DOE Assistance Regulations (Reference 7, page 97) govern all financial assistance relationships with the Department.

Competitive Solicitations

There are several types of competitive solicitation documents issued by the DOE Procurement and Contracts Management Directorate and certain DOE field contracting offices. Various types of solicitations that call for the submission of proposals or applications are described below.

- **Program Opportunity Notice (PON)**—A notice used principally to solicit competitive proposals for energy demonstration projects when there is a stated general objective, but no prescribed statement of work, and diverse approaches are desired. PONs may result in the award of procurement contracts or various financial assistance instruments.
- **Program Research and Development Announcement (PRDA)**—An announcement used to solicit a broad mix of research, development, and related energy project proposals. While a Program Opportunity Notice is geared strictly to demonstration projects utilizing existing, commercially applicable technology, a PRDA solicits proposals for projects in areas where research and development is required within broadly defined areas of interest, but it is difficult to describe in detail the nature of the work contemplated because of:
  - The multiplicity of possible approaches available for solving the problems;
  - The desirability of using several organizations in solving the problems posed;

  - The expectation that many proposers will have qualifications or specialized capabilities that will enable them to perform portions of the program, so that the support may be broken into segments that cannot be ascertained in advance; and
  - The desirability of fostering new and creative solutions.

PRDAs may result in the award of procurement contracts or various financial assistance instruments.

- **Program Solicitation (PS)**—A notice used to request proposals to be competitively evaluated for DOE assistance awards, usually when program needs are clearly defined. It is sometimes distributed as part of a program regulation and published in the Federal Register.

Synopses of these competitive solicitation notices are published in the Commerce Business Daily (Reference 2) and may also be published in professional journals and news publications. Such publication is in keeping with the DOE policy of providing timely notice to the public as to the availability of assistance awards and acquisition contracts.

Two other types of solicitation documents are used to solicit competitive proposals for procurement contracts in accordance with the Federal Procurement Regulations:

- **Invitation for Bids (IFB)**—A document used to solicit bids in response to detailed specifications. Award is based on price competition and a fixed price type of procurement contract usually results. Requirements are usually of a hardware nature and formal advertising procedures are followed. They contain detailed specifications and terms and conditions of the procurement. Each invitation for bid also sets forth the place, date and time for the formal recording and opening of bids. The evaluation and award process is conducted in strict compliance with the Invitation for Bid and in accordance with procurement regulations.
- **Request for Proposal (RFP)**—A document used to solicit proposals in response to a broader statement of work that normally incorporates performance specifications rather than detailed design specifications. Each Request for Proposal sets forth the place, date and time for the submission of proposals. The evaluation, selection, negotiation and award process is conducted in accordance with the terms of the solicitation document and procurement regulations.

Universities responding to competitive announcements will be expected to comply with all conditions stated in the announcements for proposal submission, review and evaluation. If an award results, they will similarly be expected to meet all stipulated requirements for reporting, audits and the like.

Unsolicited Proposals

Policies

Because present and future energy needs demand full exploitation of all energy alternatives, it is DOE policy to encourage individuals and organizations to submit unsolicited proposals on unique, innovative approaches and ideas that they believe merit public support.

In furtherance of this policy, DOE will:

- Publicize DOE interest in unsolved technical areas whose solutions are considered relevant to the accomplishment of DOE's mission;

- Process unsolicited proposals in an expeditious manner and keep proposers advised as evaluation and acceptance decisions are made;
- Ensure that all possible sponsors within the Department are aware of the proposal's existence;
- Ensure that each proposal is evaluated in a fair and objective manner;
- Ensure that each proposal is used only for its intended purpose (Government personnel will not use any data, concept, idea or other part of an unsolicited proposal as the basis for a solicitation or in negotiations with any other firm. However, this prohibition does not preclude using any data, concept or idea available to the Government from other sources without restriction);
- Encourage the submitter of an unsolicited proposal to mark it with a legend restricting the disclosure and use of data contained in the proposal (Government personnel will not disclose restrictively marked information included in an unsolicited proposal. The disclosure of such information concerning trade secrets, processes, operations, style of work, apparatus, and other matters, except as authorized by law, may result in criminal penalties); and
- Encourage program staffs to develop and publish statements of program interest in those technical areas and new technology directions that might be addressed by unsolicited proposals from the research community.

Procedures

An unsolicited proposal is submitted solely on the initiative of the proposer. The idea presented in a proposal may be prompted by a Notice of Program Interest; however, this is not a prerequisite for the submission of an unsolicited proposal. A Notice of Program Interest may be published by DOE whenever the Department wishes to stimulate a particular program effort but has not specifically identified any projects. Notices provide information about DOE interest in innovative approaches applicable to specific problem areas involving energy and related technology utilization. They are not formal solicitations, but are instead a communication device that informs and helps potential proposers focus on areas where unsolicited proposals may be mutually beneficial to DOE programs and the proposer. They are generally published in the Commerce Business Daily and widely distributed to industry associations, including small business associations; schools, colleges, and universities; appropriate professional and scientific journals; state, local and regional governmental organizations; other DOE offices; and individuals and organizations who request copies on a one-time basis.

In the unsolicited proposal, the proposer must present project objectives and their pertinence to the DOE mission; justify the rationale of the approach and the methods to be employed; indicate the relevant qualifications of the investigator(s) and sponsoring institution, and the level of funding required to attain the objectives. The proposal should be self-explanatory and written with clarity and thoroughness. It alone will serve as the means to persuade the staff of DOE, and other qualified members of the scientific and engineering community who might review it, that the proposed project is worthwhile.

The Department of Energy is not responsible for costs incurred in the preparation of proposals. Therefore, prior to expending resources in the development of an unsolicited proposal, prospective proposers are encouraged to consult informally with DOE program personnel by letter, telephone, or personal visit to ascertain their potential interest. Such preliminary contact serves to establish an understanding between the proposer and DOE and should reduce paperwork and loss of time. Note that these informal discussions do not constitute authorization to perform work at Government expense in anticipation of an award. The names of DOE staff members consulted should be included in the transmittal letter that accompanies the unsolicited proposal, to ensure their receipt of the proposal.

The unsolicited proposal forms the basis for both further technical evaluation and contract negotiations. Although no particular format need be followed for the submission of unsolicited proposals, there are several items that must be included. These are basic information about the submitter, his or her organization and proposed project dates; project business and financial information including cost and labor hour requirements; and project technical information including a detailed statement of work, and facility and equipment requirements, if any.

Detailed procedures and instructions for preparing and submitting unsolicited proposals are set forth in Federal Procurement Regulation 1-4.9, DOE Procurement Regulation 9-4.9 and DOE Assistance Regulation 600.34.

Further information on the submission of unsolicited proposals can be found in the booklet entitled "Guide for the Submission of Unsolicited Proposals" (Reference 1, page 97). The material in the booklet, along with information learned through informal consultation, will assist the proposer in producing an unsolicited proposal that presents the project in the best possible light.

Part I of this publication identifies many program offices that may be contacted by interested persons. However, should a proposer need assistance in locating an appropriate program, the following office can provide assistance:

Business Liaison Division
Procurement and Contracts Management
Directorate
U.S. Department of Energy
Washington, D.C. 20585
(202) 252-9050

There are no specific dates for the submission of unsolicited proposals; but, because a comprehensive review is required before a proposal can be acted upon, new proposals should be submitted as early as possible, usually a minimum of six months in advance of the desired period of support. However, it should not be assumed that in all cases a six-month lead time is adequate. Proposals should be submitted to:

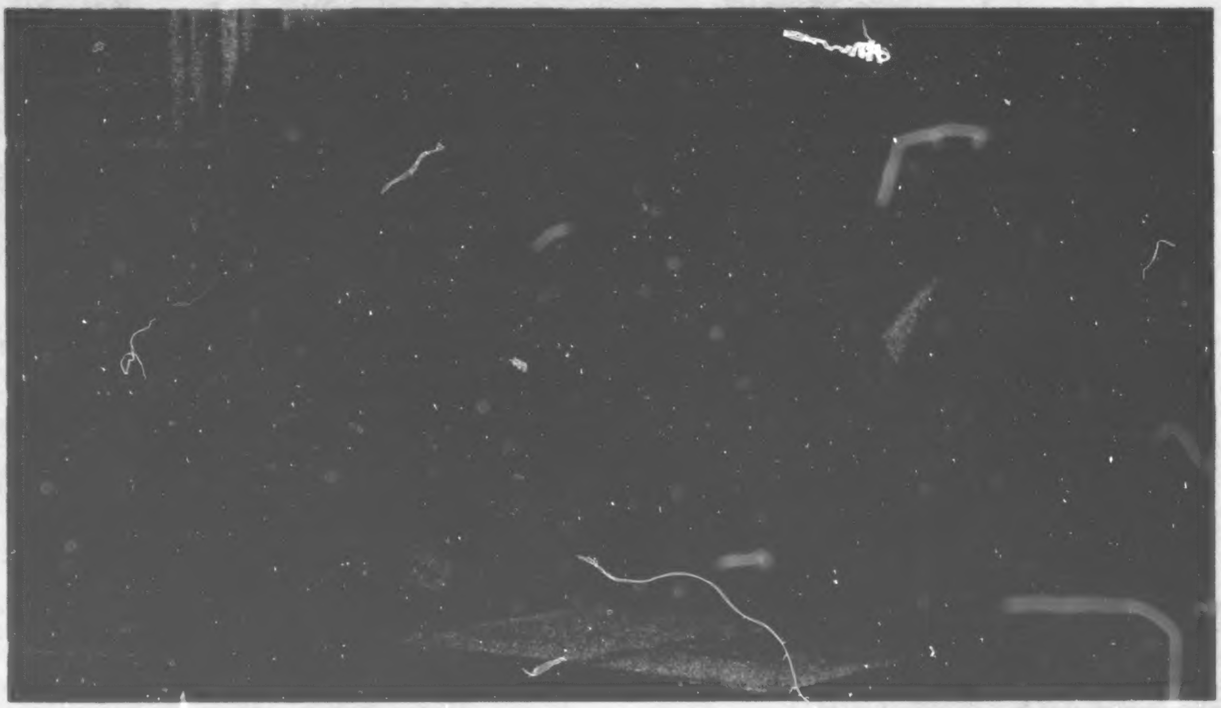
Unsolicited Proposal Coordinator
Reports and Analysis Branch
Procurement and Contracts Management
Directorate
U.S. Department of Energy
Washington, D.C. 20585

The Unsolicited Proposal Coordinator is responsible for logging and monitoring the status of all unsolicited proposals formally submitted to DOE. If the proposer has identified the appropriate program office to which a specific proposal is to be submitted, a minimum of six copies of the unsolicited proposal should be sent to that office with a letter of transmittal. An additional copy with all required signatures, together with a copy of the transmittal letter, should be sent to the Unsolicited Proposal Coordinator for control purposes. If the proposer has not identified a specific program to which a proposal is to be sent, a minimum of seven copies should be sent to the Unsolicited Proposal Coordinator cited above. The Coordinator will acknowledge receipt of the unsolicited proposal, provide the DOE control number and identify the program office(s) to which the proposal has been referred. Some proposals may have the potential for support by more than one DOE program office, in which case the proposal may be referred to all potentially interested groups.

Proposal Review and Evaluation

Solicited Proposals

Solicitations set forth the specific criteria to be used in the proposal evaluation and review process. Such proposals are normally reviewed only by Government personnel.



Unsolicited Proposals

Review

Prior to making a comprehensive evaluation, DOE will review the proposal to determine whether the document contains the minimum prescribed information, has been approved by a person authorized to represent the proposer organization and falls within the scope of an unsolicited proposal. If the proposal satisfies the requirements of the preliminary review, copies will be forwarded to appropriate offices for evaluation.

If the document does not satisfy all of the foregoing requirements, a copy may be forwarded to a knowledgeable person for review of its technical merit. If the decision made as a result of this preliminary review is unfavorable, no further comprehensive evaluation may be made. The proposer will be told how the document has been interpreted and the reason it is not being considered as an unsolicited proposal. However, if the document contains most of the information required and appears to have technical merit, the missing information may be requested so that it can be processed as an unsolicited proposal.

Evaluation

The detailed evaluation criteria used in reviewing an unsolicited proposal are contingent upon whether the project, for which the proposal is to be considered, is principally one of acquisition or assistance:

- If the project is principally one of assistance, the supporting instrument will be an assistance instrument, i.e., either a grant, cooperative agreement, direct loan or loan guarantee. The evaluation criteria for assistance instruments are set forth in the DOE Assistance Regulations (Reference 7, page 97).
- If the project is principally one of acquisition, the supporting instrument will be a contract. The evaluation criteria for contracts are set forth in the Federal and DOE Procurement Regulations (Reference 6, page 97).

In general, these criteria address:

- Technical merit or program value in terms of:
  - Anticipated objectives to be achieved and the probability of achieving them;
  - The qualifications, capabilities and experience of the proposed investigator, team leader, or key personnel, who are considered to be critical in achieving the objectives of the proposal.
- Whether the proposal has:
  - High technical merit representing an innovative idea, method, or approach; or
  - Program value not previously recognized by DOE;
- The potential contribution that the proposed work is expected to make;
- The economic, environmental and societal significance for the national energy program;

- The relationship of the proposal to:
  - Public need for the research, development or demonstration effort and whether similar results would be achieved in a timely manner without Federal assistance.
  - Whether opportunities to recapture the investment are adequate;
  - The extent of the problems treated and whether the objectives sought are national, widespread or regional in significance;
  - The extent of opportunities to induce non-Federal support through regulatory actions, end-use controls, tax and price incentives, public education or other alternatives to direct Federal financial assistance; and
  - The degree of risk or loss of the investment and the availability of risk capital to non-Federal agencies which might otherwise engage in the research.

Recent analysis of unsolicited proposals indicates that about 40 percent of new proposals were approved on an agency-wide basis. If DOE decides to support a proposal, the proposer will be so advised but may be asked to submit additional details, to revise budgets, or to confirm the proposal goals as approved. Plans for initiating the project may be agreed upon at that time. However, no actual commitment of funds may be made by the recipient until formal notification action is completed. Preaward costs are generally not allowable. When the program office has determined that a proposal will be funded, contract office personnel, usually in a field office, will be requested to negotiate the contractual agreement with the institution concerned. Cognizant DOE offices for major colleges and universities are shown on page 103.

An unsolicited proposal may propose activities that are also of interest to other Federal agencies. In such cases, with the prior written approval of the proposer, interagency proposal evaluation may be initiated. If the proposal is found acceptable, another agency may write a separate agreement with the proposer, or DOE may jointly fund the program with the other agency.

Types of Award Instruments

Projects usually fall into one of two classes, acquisition or assistance. The determination of whether a project is one of acquisition or assistance is made at a DOE program policy level. Such determination does not limit the type of instrument used for a given transaction.

There are three types of instruments generally used to provide funds for research projects—grants, cooperative agreements, and procurement contracts (including Special Research Contracts). The choice of award instrument lies within the administrative discretion of DOE, except when prohibited or limited by law. The decision as to which form of award instrument will be used is based on the purpose of the project and the extent of Federal involvement necessary to ensure project success. An award instrument identifies the terms and conditions, and the nature of this relationship between DOE and the recipient.

- A procurement contract is used as the funding instrument whenever the principal purpose is the acquisition by purchase, lease, or barter of property or services for the direct benefit or use of the Federal Government, or whenever DOE determines in a specific instance that the use of a contract is appropriate.
  - A Special Research Contract (SRC) is a simplified form of procurement contract which may be used for educational and not-for-profit research institutions conducting basic research, where the annual DOE support does not exceed $1,000,000.
- An assistance instrument is used to provide assistance support whenever the principal purpose is to accomplish a public purpose of support or stimulation authorized by Federal statute.
  - A grant type of assistance instrument is used whenever no substantial involvement is anticipated between DOE and recipient during performance of the activity.
  - A cooperative agreement is used whenever substantial involvement is anticipated between DOE and the recipient during performance of the activity. Each cooperative agreement shall include an explicit statement of the nature, character and extent of the anticipated DOE involvement.

Patents, Data and Copyrights

Under DOE statutory patent policy, DOE normally reserves the right to title in all inventions conceived or first actually reduced to practice in the course of or under contracts, grants, or other agreements involving research, development or demonstration. In such instances, the contractor or assistance recipient is normally reserved a royalty-free, nonexclusive, revocable license for the use of such inventions. However, at or before contracting, a contractor or recipient is permitted to request an advance waiver of the Government's rights in inventions. Also, the contractor or recipient may request waiver of the Government's rights in identified inventions after the time of contracting.

DOE recognizes that a contractor, assistance recipient or their employees may desire to publish, within the limits of security rquirements, information regarding scientific or technical developments made or conceived in the course of their work under agreement with DOE. So that premature public disclosure of such information will not adversely affect the patent interest of DOE, the contractor, or the assistance recipient, the contract or grant provides DOE with a 60-day period to determine whether patent protection should be obtained prior to release of information.

DOE Procurement Regulations, Section 9, Chapter 9 (Reference 6) and DOE Assistance Regulations (Reference 7) contain policies and detailed procedures on patents, data and copyrights.

Classified Research and Security Considerations

Classification

Most proposals for DOE research and development projects are unclassified. If, however, during the evaluation of a proposal it is found that the work will be in or border on a classified topic, any resulting contractual arrangement will take this into account and the assistance recipient or contractor will be required to comply with applicable Government security regulations. Certain contractual provisions or assistance conditions can be included in an award instrument to allow for termination of the arrangement, should a classified topic develop during the course of work (References 6 and 7).

Security

Where possible, an unclassified proposal should be submitted. However, if this is not feasible, the proposal must be classified in accordance with its content. Additional guidance with regard to the preparation, handling and disposition of a classified proposal may be obtained from:

Office of Safeguards and Security
U.S. Department of Energy
Century XXI
Germantown, Maryland 20545

Reports

Recipients of financial assistance or procurement contract awards will be expected to satisfy reporting requirements stipulated in the solicitation, the award instrument, or applicable regulations. For additional information on procurement contract reporting, see DOE Uniform Contractor Reporting System Guidelines, Volume I (Reference 13).

The selection of appropriate reports, their frequency and the amount of detail will vary with several factors including the program objectives, amount of funding and type of instrument awarded. DOE program managers have been instructed to use discretion in report selection in order to keep administrative burdens to a minimum.

Audits

Public laws authorizing DOE to issue contracts, grants and cooperative agreements provide authority to audit and examine the books and records of the recipients of contracts and financial assistance.

Department of Energy awards to universities are audited in accordance with the provisions of applicable DOE regulations. The cognizant audit agency for most colleges and universities is the U.S. Department of Health, Education and Welfare. In certain instances DOE itself may conduct an audit of awards to a university.

Audit functions in the Department are directed by the DOE Inspector General and are performed in accordance with generally accepted auditing standards and applicable Federal regulations.

The objectives of audits are to determine whether a contractor's management, accounting, procurement, and property control systems and procedures provide assurance to DOE that costs claimed are reasonable, allowable and allocable under the procurement and assistance terms and conditions; and to review the contractor's compliance with applicable Federal and DOE procurement and assistance regulations, and provide recommendations for improvement where needed.

Auditors will generally give advance notice prior to the start of an audit.

Additional details of DOE audit procedures are contained in Department handbooks and regulations. Audit questions should be directed to the Office of the Inspector General, U.S. Department of Energy, Washington, D.C. 20585.

Glossary

B/O (Budget Outlays) — The sum of the outlays (disbursements) from appropriations and funds, less offsetting receipts.

Cooperative Agreements and Grants — Award instruments between the Federal Government and a state government, university, or other recipient whereby the Federal Government provides assistance in the form of money, property, services or anything of value to the recipient to accomplish a public purpose of support or stimulation. A cooperative agreement is similar to a grant except that it describes a relationship whereby the Government has substantial involvement with the recipient during the performance of the effort. A grant calls for comparatively little Government involvement.

Federal Assistance — Government-provided funds or aid in kind to accomplish a public purpose of stimulation or support authorized by Federal statute. It includes cooperative agreements, grants and certain other forms of Government support such as loans and loan guarantees.

Notice of Program Interest — A published statement of DOE program interest in general technical problem areas needing investigation which might be addressed by unsolicited proposals.

Procurement Contract — A contractual instrument used when the Federal Government procures property or services for its direct benefit, i.e., use or consumption.

Program — An organizational set of activities directed toward a common purpose, objective, or goal undertaken or proposed by an agency in order to carry out responsibilities assigned to it.

Project - An endeavor with a specific objective to be met within prescribed time and dollar limitations and which has been assigned for work definition or execution.

Solicited Proposal or Application — A written response to a formal solicitation notice issued by the Government, generally in a competitive acquisition or assistance process.

Unsolicited Proposal — A written offer to perform a proposed effort submitted solely on the initiative of the offerer, with the objective of obtaining financial support and not in response to a specific request of the Government. The unsolicited proposal is used to request either support of a new project or continued support of a previously funded effort (renewal).

References and Bibliography

Reference Number

1. Guide for the Submission of Unsolicited Proposals (DOE/PR-0010), February 1980, GPO (Stock Number 061-000-00140-9), NTIS.
2. Commerce Business Daily, available by subscription from GPO.
3. Federal Register, available by subscription from GPO.
4. Catalog of Federal Domestic Assistance, available by single copy or subscription from GPO.
5. OMB Circular Nos. A-21, A-102, A-110 and A-111, OMB.
6. DOE Procurement Regulations (DOE/PR-0028), June 1979, published in the Federal Register and in the Code of Federal Regulations (CFR) as Chapter 9, Title 41, GPO (Stock Number 061-000-00316-9).
7. Federal Register, DOE Assistance Regulations, (10 CFR 2-600), March 8, 1979, GPO.
8. Federal Register, Cooperative Agreements (Proposed Rule), April 5, 1979, GPO.
9. Standards for Audit of Governmental Organizations, Programs, Activities and Functions, issued by the Comptroller General of the United States, GPO (Stock Number 020-000-00110-1).
10. Audit Guide for Department of Energy Grants, (DOE/IG-0005), revised edition, November 1978, GPO/NTIS.
11. DOE Research and Development and Field Facilities (DOE/ER-0029), June 1979, GPO (Stock Number 061-000-00318-5), NTIS.
12. Headquarters DOE Supplemental Telephone Directory (DOE/AD-0002/7), January 1980, GPO/NTIS.
13. DOE Uniform Contractor Reporting System Guidelines, Volume I, (DOE/CR-0001/2), September, 1978, GPO/NTIS.

Publications listed above can be obtained from:

GPO — Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402
(202) 783-3238

NTIS — National Technical Information Service
Department of Commerce
5285 Port Royal Road
Springfield, VA 22161

OMB — Office of Management and Budget
Publication Office
Office of Administration
726 Jackson Place, N.W.
Room G-236
Washington, D.C. 20503

DOE Regions

[redacted]

[redacted]

[redacted]

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VII (KANSAS CITY)	MARY O'HALLORAN [illegible] EAST 11TH STREET KANSAS CITY, MISSOURI [illegible]	[illegible] [illegible]
VIII (DENVER)	CHARLES F. [illegible] P.O. BOX [illegible] - BELMAR BRANCH [illegible] SOUTH YUKON STREET LAKEWOOD, COLORADO [illegible]	[illegible] [illegible]
IX (SAN FRANCISCO)	WILLIAM C. ARNTZ [illegible] PINE STREET 3RD FLOOR SAN FRANCISCO, CALIFORNIA [illegible]	[illegible] [illegible]
X (SEATTLE)	JACK B. ROBERTSON [illegible] FEDERAL BUILDING [illegible] SECOND AVENUE SEATTLE, WASHINGTON [illegible]	[illegible] [illegible]

Addresses for Field Organizations

ALBUQUERQUE OPERATIONS OFFICE
P.O. Box 5400
Albuquerque, New Mexico 87115

AMARILLO (PANTEX) PLANT
P. O. Box 647
Amarillo, Texas 79177

AMES LABORATORY
Iowa State University
Ames, Iowa 50011

ARGONNE NATIONAL LABORATORY
9700 South Cass Avenue
Argonne, Illinois 60439

ASHTABULA EXTRUSION PLANT
P.O. Box 579
Ashtabula, Ohio 44004

BARTLESVILLE ENERGY TECHNOLOGY CENTER
P.O. Box 1398
Bartlesville, Oklahoma 74003

BATES LINEAR ACCELERATOR FACILITY
Massachusetts Institute of Technology
P. O. Box 95
Middleton, Massachusetts 01949

BETTIS ATOMIC POWER LABORATORY
P.O. Box 79
West Mifflin, Pennsylvania 15122

BROOKHAVEN NATIONAL LABORATORY
Upton, Long Island, New York 11973

CARBONDALE MINING TECHNOLOGY CENTER
P.O. Box 2587
Carbondale, Illinois 62901

CENTER FOR ENERGY AND ENVIRONMENT RESEARCH
University of Puerto Rico
Caparra Heights Station
San Juan, Puerto Rico 00935

CHICAGO OPERATIONS AND REGIONAL OFFICE
9800 South Cass Avenue
Argonne, Illinois 60439

CLINCH RIVER BREEDER REACTOR PLANT PROJECT OFFICE
P.O. Box U
Oak Ridge, Tennessee 37830

COMPARATIVE ANIMAL RESEARCH LABORATORY
1299 Bethel Valley Road
Oak Ridge, Tennessee 37830

ENERGY TECHNOLOGY ENGINEERING CENTER
P.O. Box 1449
Canoga Park, California 91304

ENVIRONMENTAL MEASUREMENTS LABORATORY
376 Hudson Street
New York, New York 10014

FAST FLUX TEST FACILITY PROJECT OFFICE
P.O. Box 550
Richland, Washington 99352

FEED MATERIALS PRODUCTION CENTER
P.O. Box 39158
Cincinnati, Ohio 45239

FERMI NATIONAL ACCELERATOR LABORATORY
P.O. Box 500
Batavia, Illinois 60510

FRANKLIN McLEAN MEMORIAL RESEARCH INSTITUTE
University of Chicago
950 East 59th Street
Chicago, Illinois 60637

GRAND FORKS ENERGY TECHNOLOGY CENTER
P.O. Box 8213
University Station
Grand Forks, North Dakota 58202

GRAND JUNCTION OFFICE
P.O. Box 2567
Grand Junction, Colorado 81502

HANFORD ENGINEERING DEVELOPMENT LABORATORY
P.O. Box 1970
Richland, Washington 99352

HANFORD PRODUCTION OPERATIONS UNITED NUCLEAR INDUSTRIES, INC.
Hanford Operations
P.O. Box 490
Richland, Washington 99352

IDAHO NATIONAL ENGINEERING LABORATORY
550 Second Street
Idaho Falls, Idaho 83401

IDAHO OPERATIONS OFFICE
550 Second Street
Idaho Falls, Idaho 83401

INHALATION TOXICOLOGY RESEARCH INSTITUTE
Lovelace Biomedical and Environmental Research Institute
P.O. Box 5890
Albuquerque, New Mexico 87115

KANSAS CITY (BENDIX) PLANT
P.O. Box 1159
Kansas City, Missouri 64141

KNOLLS ATOMIC POWER LABORATORY
P.O. Box 1072
Schenectady, New York 12301

LABORATORY FOR ENERGY-RELATED HEALTH RESEARCH
University of California
Davis, California 95616

LABORATORY OF NUCLEAR MEDICINE AND RADIATION BIOLOGY
University of California
900 Veteran Avenue
Los Angeles, California 90024

LABORATORY OF RADIOBIOLOGY—UNIVERSITY OF CALIFORNIA, SAN FRANCISCO
School of Medicine
University of California
San Francisco, California 94143

LARAMIE ENERGY TECHNOLOGY CENTER
P.O. Box 3395
University Station
Laramie, Wyoming 82071

LAWRENCE BERKELEY LABORATORY
University of California
Berkeley, California 94720

LAWRENCE LIVERMORE NATIONAL LABORATORY
University of California
P.O. Box 5012
Livermore, California 94550

LOS ALAMOS NATIONAL SCIENTIFIC LABORATORY
University of California
P.O. Box 1663
Los Alamos, New Mexico 87545

MICHIGAN STATE UNIVERSITY—DOE PLANT RESEARCH LABORATORY
East Lansing, Michigan 48824

MORGANTOWN ENERGY TECHNOLOGY CENTER
P.O. Box 880
Morgantown, West Virginia 26505

MOUND FACILITY
P.O. Box 32
Miamisburg, Ohio 45342

NEVADA OPERATIONS OFFICE
P.O. Box 14100
Las Vegas, Nevada 89114

NEVADA TEST SITE
P.O. Box 14400
Las Vegas, Nevada 89114

NEW BRUNSWICK LABORATORY
9800 South Cass Avenue
Argonne, Illinois 60439

NOTRE DAME RADIATION LABORATORY
University of Notre Dame
Notre Dame, Indiana 45556

OAK RIDGE ASSOCIATED UNIVERSITIES
P.O. Box 117
Oak Ridge, Tennessee 37830

OAK RIDGE GASEOUS DIFFUSION PLANT
P.O. Box P
Oak Ridge, Tennessee 37830

OAK RIDGE NATIONAL LABORATORY
P.O. Box X
Oak Ridge, Tennessee 37830

OAK RIDGE OPERATIONS OFFICE
P.O. Box E
Oak Ridge, Tennessee 37830

PACIFIC NORTHWEST LABORATORY
Battelle
P.O. Box 999
Richland, Washington 99352

PADUCAH GASEOUS DIFFUSION PLANT
P.O. Box 1410
Paducah, Kentucky 42001

PINELLAS (GENERAL ELECTRIC) PLANT
P.O. Box 11508
St. Petersburg, Florida 33733

PITTSBURGH ENERGY TECHNOLOGY CENTER
4800 Forbes Avenue
Pittsburgh, Pennsylvania 15213

PITTSBURGH MINING TECHNOLOGY CENTER
4800 Forbes Avenue
Pittsburgh, Pennsylvania 15213

PITTSBURGH NAVAL REACTORS OFFICE
P.O. Box 109
West Mifflin, Pennsylvania 15122

PORTSMOUTH GASEOUS DIFFUSION PLANT
P.O. Box 628
Piketon, Ohio 45661

PRINCETON PLASMA PHYSICS LABORATORY
Princeton University
P.O. Box 451
Princeton, New Jersey 08544

RADIOBIOLOGY LABORATORY
University of Utah
Building 522
Salt Lake City, Utah 84112

RICHLAND OPERATIONS OFFICE
P.O. Box 550
Richland, Washington 99352

ROCKY FLATS (ROCKWELL) PLANT
P.O. Box 464
Golden, Colorado 80401

SANDIA NATIONAL LABORATORIES
P.O. Box 5800
Albuquerque, New Mexico 87115

SAN FRANCISCO OPERATIONS OFFICE
1333 Broadway, Wells Fargo Bldg.
Oakland, California 94612

SAVANNAH RIVER ECOLOGY LABORATORY
Drawer E
Aiken, South Carolina 29801

SAVANNAH RIVER LABORATORY
Aiken, South Carolina 29801

SAVANNAH RIVER OPERATIONS OFFICE
P.O. Box A
Aiken, South Carolina 29801

SAVANNAH RIVER WEAPONS FACILITY
Aiken, South Carolina 29801

SCHENECTADY NAVAL REACTORS OFFICE
P.O. Box 1069
Schenectady, New York 12301

SOLAR ENERGY RESEARCH INSTITUTE
1617 Cole Boulevard
Golden, Colorado 80401

STANFORD LINEAR ACCELERATOR CENTER
Stanford University
P.O. Box 4349
Stanford, California 94305

UNIVERSITY OF ROCHESTER BIOMEDICAL LABORATORY
School of Medicine and Dentistry
Rochester, New York 14642

Y-12 PLANT
P.O. Box Y
Oak Ridge, Tennessee 37830

Basic Agreements with Colleges and Universities

(As of January 1, 1980,
DOE Order 4220.1)

Albuquerque Operations Office
- University of New Mexico

Chicago Operations Office
- Amherst College
- University of Arizona
- Arizona State University
- Boston University
- Brandeis University
- Brigham Young University
- Brown University
- California State University (Fullerton)
- Carnegie Mellon University
- Case Western Reserve University
- University of Chicago
- University of Cincinnati
- University of Colorado
- Colorado State University
- Columbia University
- University of Connecticut
- Cornell University
- Dartmouth College
- University of Dayton
- Denison University
- University of Denver
- Drexel University
- Duquesne University
- Harvard University
- Hope College
- University of Illinois
- Illinois Benedictine College
- Illinois Institute of Technology *
- Illinois State University
- University of Indiana
- University of Iowa
- Iowa State University
- Johns Hopkins University
- University of Kansas
- Kansas State University
- Kent State University
- Loyola University (Chicago)
- University of Maine
- Marquette University
- University of Massachusetts
- Massachusetts Institute of Technology
- University of Michigan
- Michigan State University
- Michigan Technological University
- University of Minneapolis*
- Middlebury College
- University of Minnesota
- University of Missouri
- Mt. Holyoke College
- University of Nebraska
- New York University
- New York University - Medical College
- Niagara University
- Northeastern University
- Northern Illinois University
- Northwestern University
- University of Notre Dame
- Oakland University (Michigan)
- Ohio University
- Ohio State University*
- Ohio State Research Foundation*
- University of Pennsylvania
- Pennsylvania State University
- University of Pittsburgh
- Princeton University
- Purdue Research Foundation
- Rensselaer Polytechnic Institute
- University of Rhode Island
- University of Rochester
- State University of New York Research Foundation (New York)*
- Syracuse University
- Temple University
- Thomas Jefferson University
- Tufts University
- Vassar College
- University of Vermont
- Washington University (St. Louis)
- Wayne State University
- Wesleyan University (Connecticut)
- Williams College
- University of Wisconsin (Madison)
- University of Wisconsin (Milwaukee)
- University of Wisconsin (Whitewater)
- Wright State University
- University of Wyoming
- Yale University

Nevada Operations Office
- University of Nevada *

Oak Ridge Operations Office
- University of Alabama *
- Duke University *
- University of Florida *
- Florida State University *
- Georgetown University
- Georgia Institute of Technology *
- University of Houston *
- Howard University *

*Indicates proposed change in cognizant office.

Oak Ridge Operations Office (continued)

- Louisiana State University *
- University of Maryland *
- University of Miami (Florida) *
- Mississippi State University *
- University of North Carolina *
- University of Oklahoma *
- Oklahoma State University *
- Rice University *
- Rutgers University *
- University of Tennessee *
- University of Texas *
- Texas A&M University *
- University of Virginia *
- Virginia Polytechnic Institute and State University *
- University of West Virginia *

Richland Operations Office

- University of Alaska
- University of Montana
- Montana State University
- University of Oregon
- Oregon College of Education
- Oregon State University
- University of Washington
- Washington State University

San Francisco Operations Office

- University of California (Berkeley)
- California Institute of Technology
- University of Hawaii
- University of Southern California
- Stanford University
- University of Utah *

Savannah River Operations Office

- University of Georgia
- North Carolina State University *

Headquarters Procurement Operations

- Auburn University *
- Colorado School of Mines *
- University of Delaware *
- George Washington University *
- Lehigh University *
- University of New Hampshire *

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*Indicates proposed change in cognizant office.

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